

# KIC 005903749

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005903749-01	OBS	3029.01	18.976293	134.834764	367.7	2.575	10.2	11.4	0.99	5300	2.49	39.17
005903749-02	OBS	3029.02	6.347276	132.998375	142.9	3.347	8.6	9.2	0.99	5300	1.42	168.71

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005903749-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
005903749-02	OBS	PC	0.98	0	0	0	0	NO_COMMENT

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

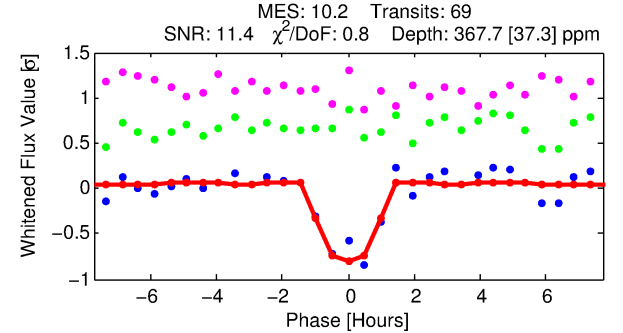
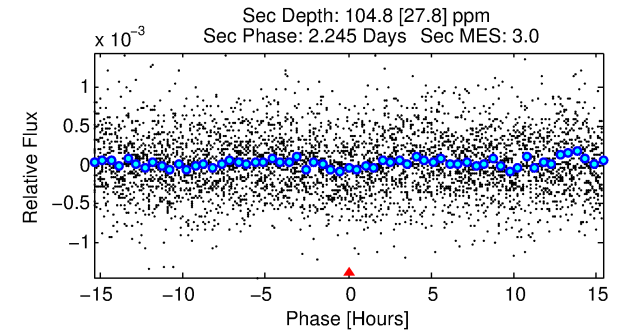
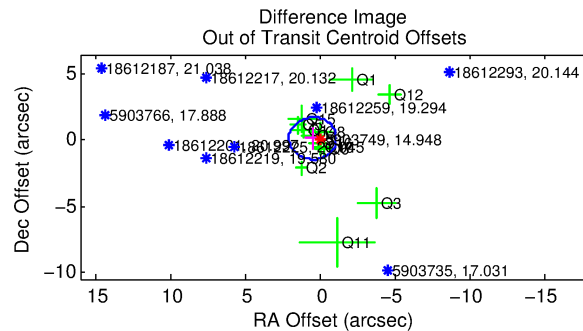
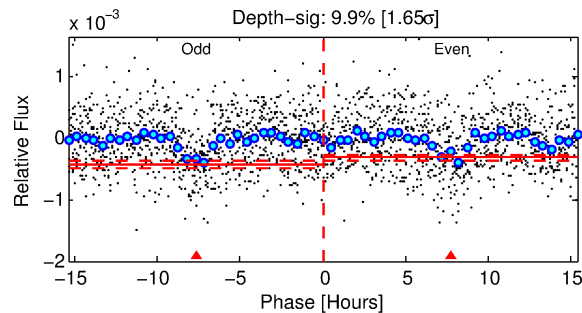
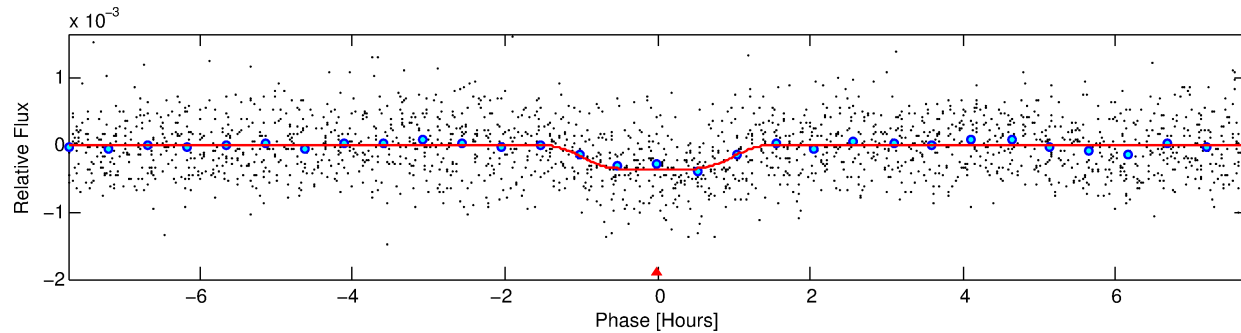
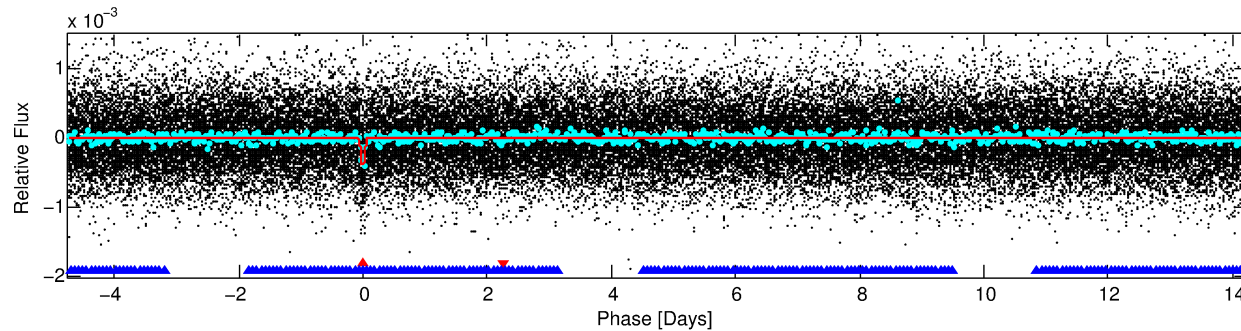
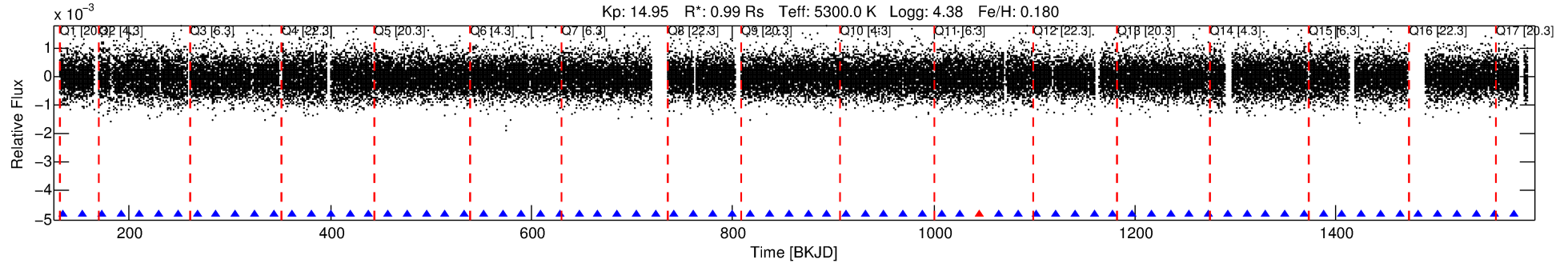
## Ephemeris Match Information For 005903749-01

No Significant Match Found

# DV One-Page Summary

KIC: 5903749 Candidate: 1 of 2 Period: 18.976 d

KOI: K03029.01 Corr: 0.963



## DV Fit Results:

Period = 18.97629 [0.00012] d  
Epoch = 134.8348 [0.0052] BKJD  
Rp/R\* = 0.0231 [0.0031]  
a/R\* = 20.84 [10.21]  
b = 0.95 [0.05]  
Seff = 39.17 [8.54]  
Teq = 638 [35] K  
Rp = 2.49 [0.45] Re  
a = 0.1325 [0.0167] AU  
Ag = 163.45 [70.47] [2.31 $\sigma$ ]  
Teffp = 3527 [336] K [8.55 $\sigma$ ]

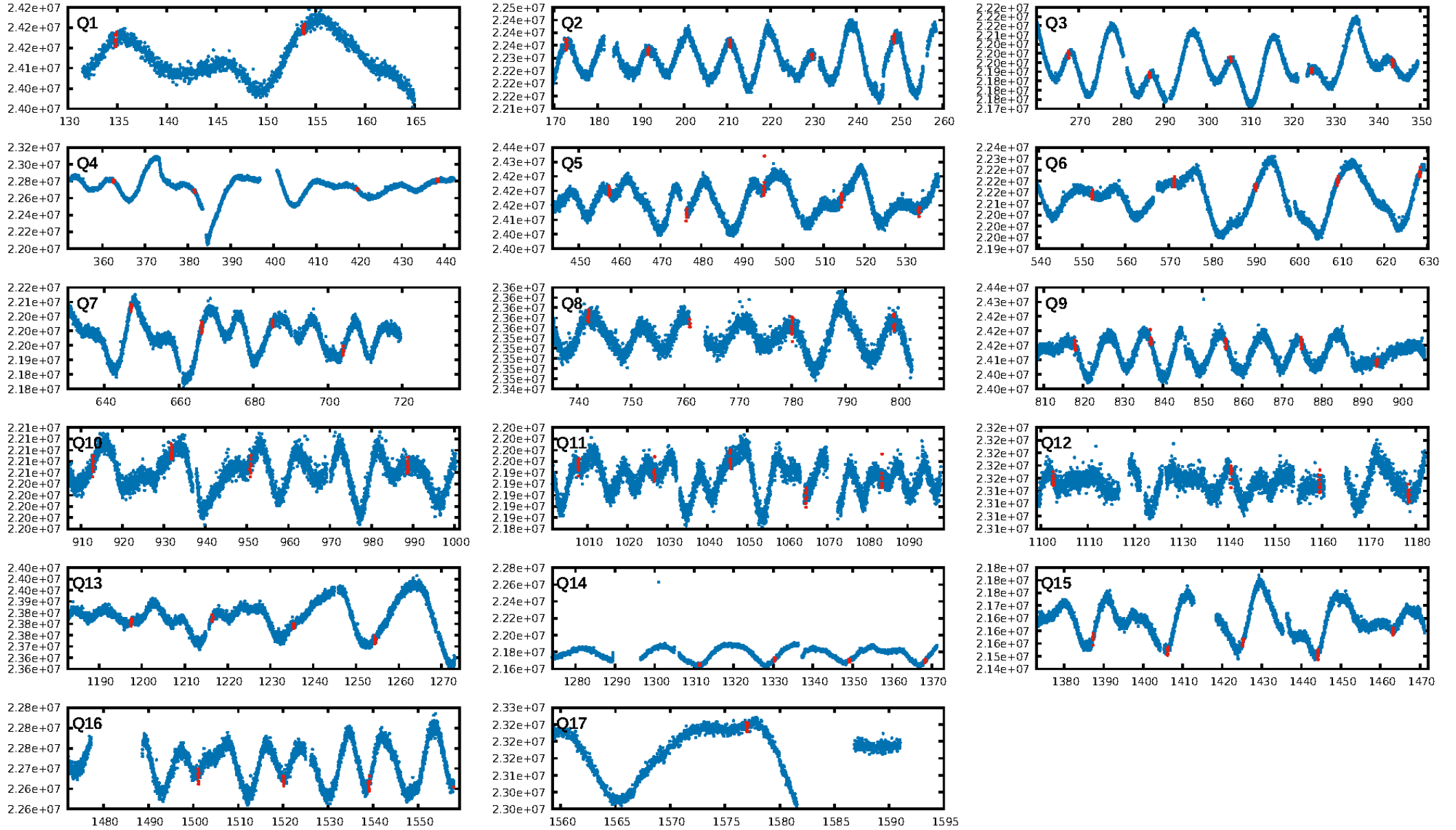
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [71.78 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 95.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.06e-23  
RollingBand-fgt: 0.98 [65/66]  
GhostDiagnostic-chr: 1.977  
Centroid-sig: 12.2%  
Centroid-so: 2.068 arcsec [1.82 $\sigma$ ]  
OotOffset-rm: 0.489 arcsec [0.92 $\sigma$ ]  
KicOffset-rm: 0.462 arcsec [0.80 $\sigma$ ]  
OotOffset-st: 4/3/4/2 [13]  
KicOffset-st: 4/3/4/2 [13]  
DiffImageQuality-fgm: 0.38 [5/13]  
DiffImageOverlap-fno: 0.94 [16/17]

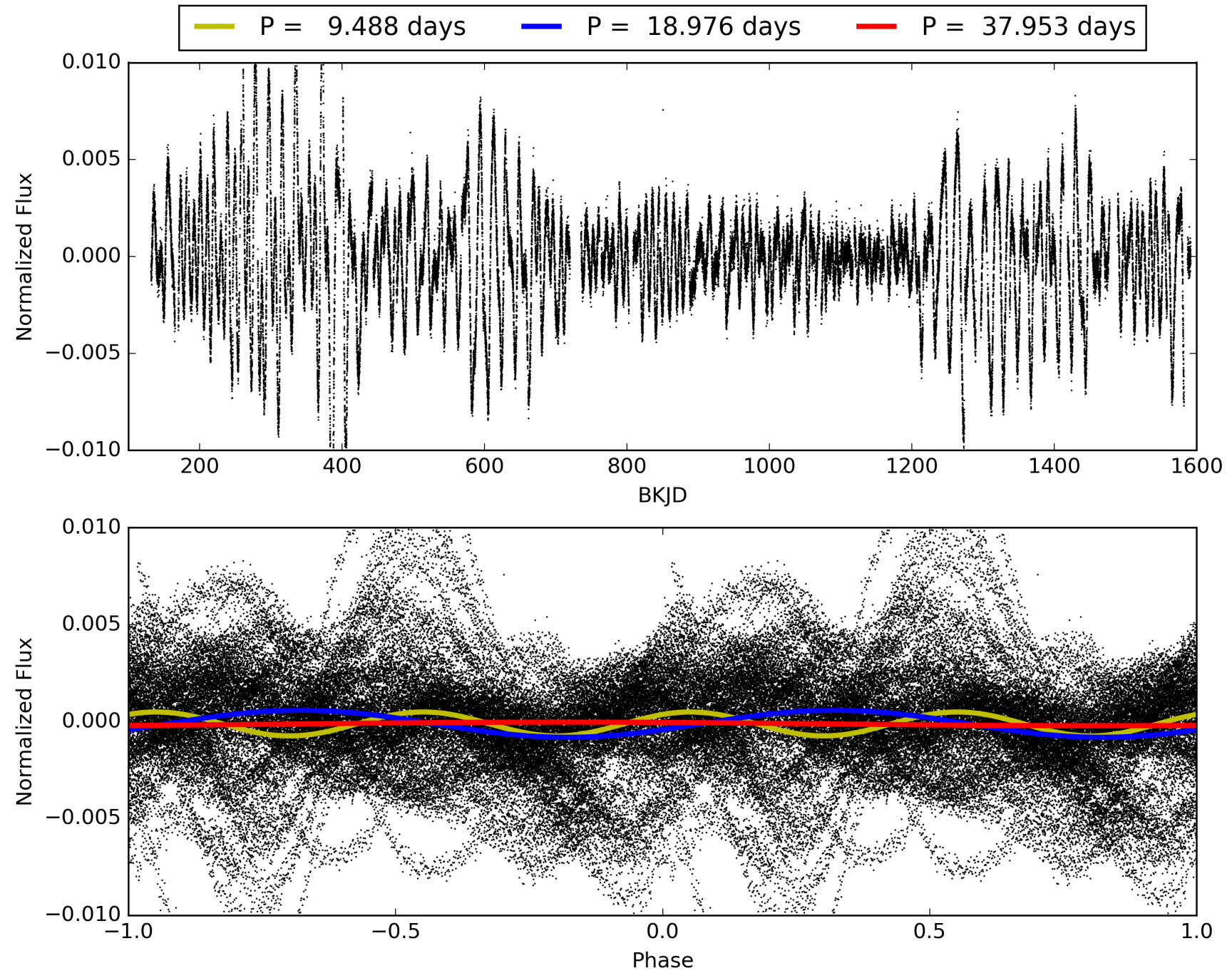
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 15:19:02 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005903749-01, PDC Light Curves

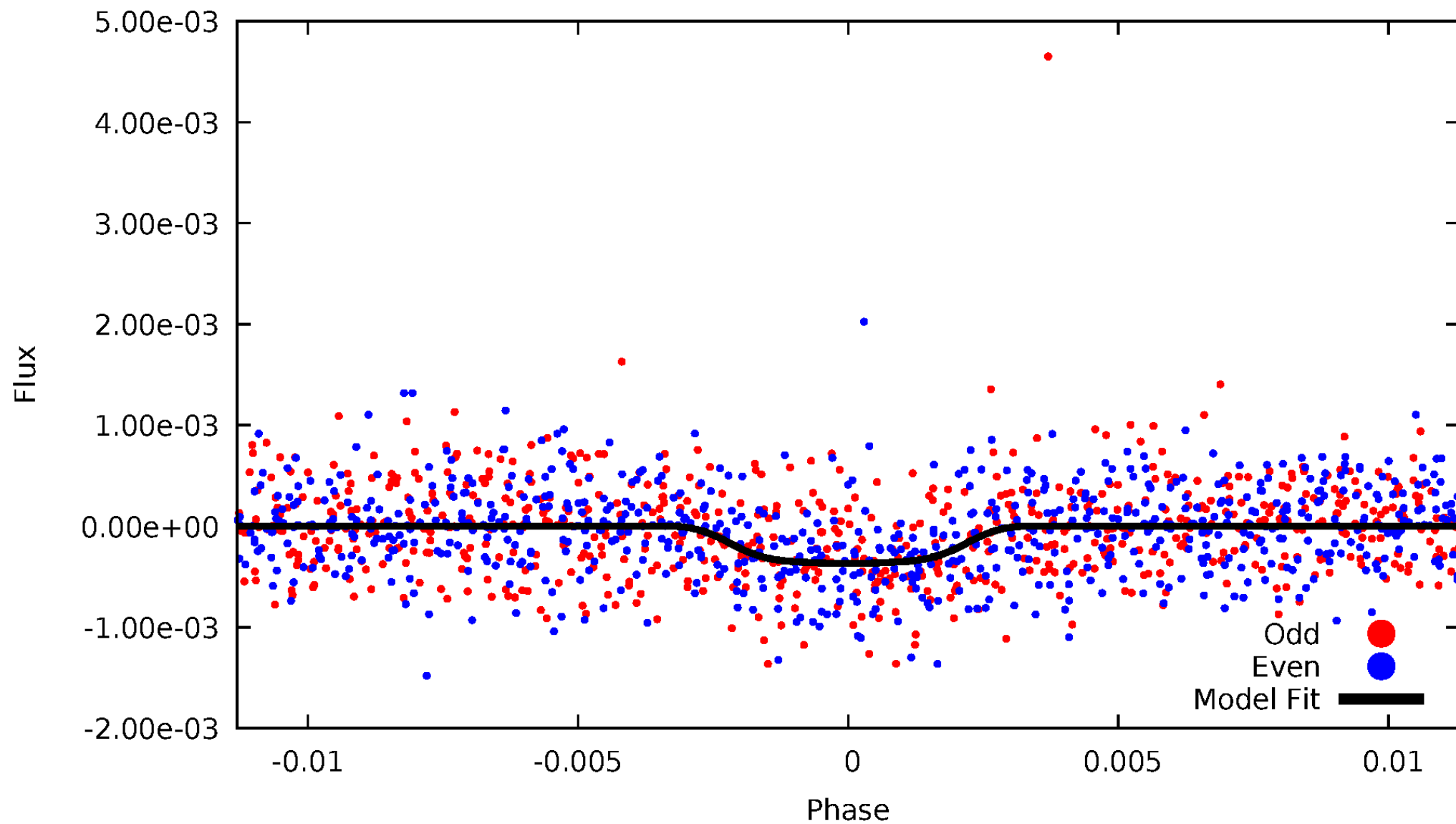


TCE 005903749-01



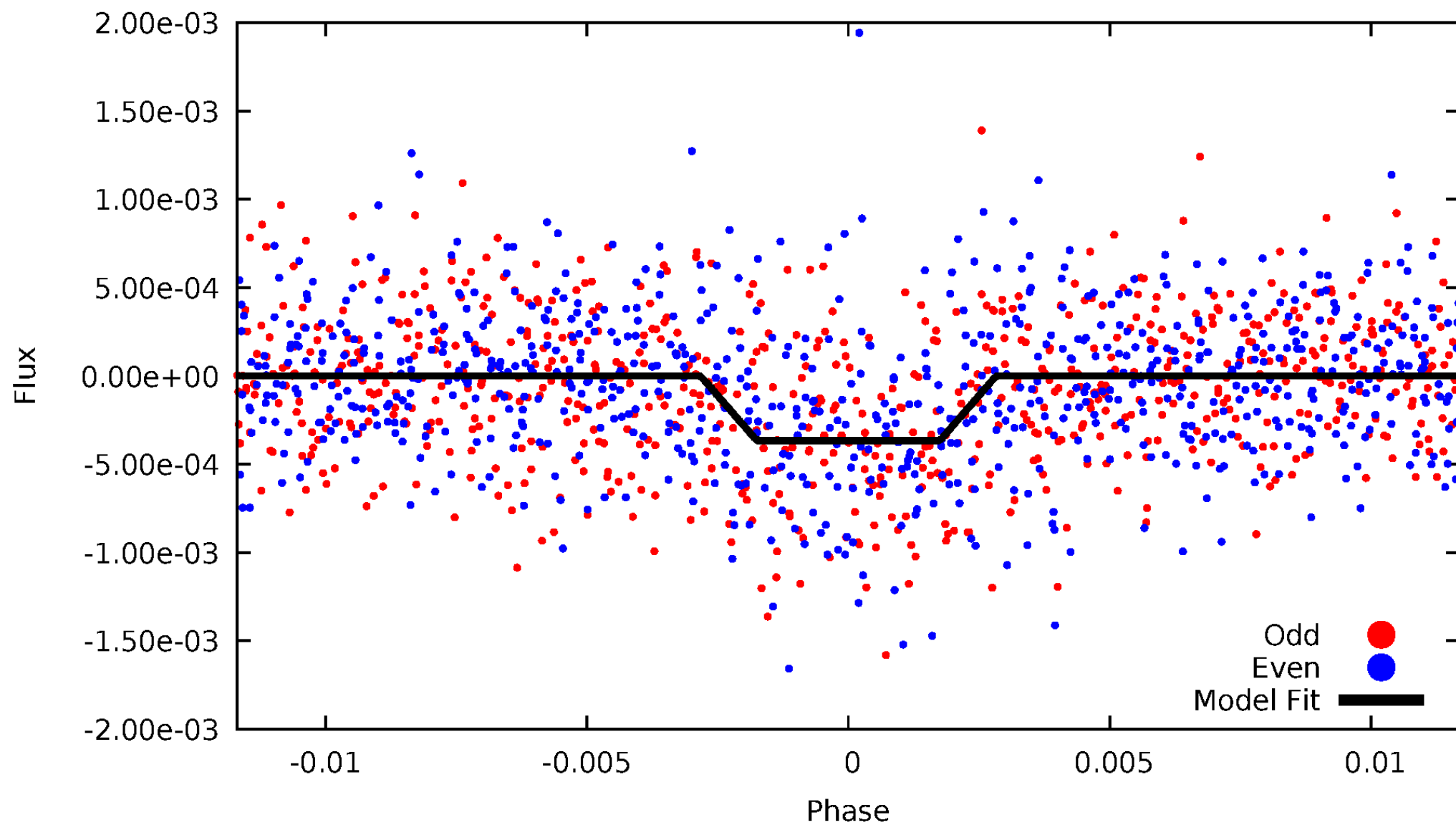
# DV Odd/Even

TCE 005903749-01



# ALT Odd/Even

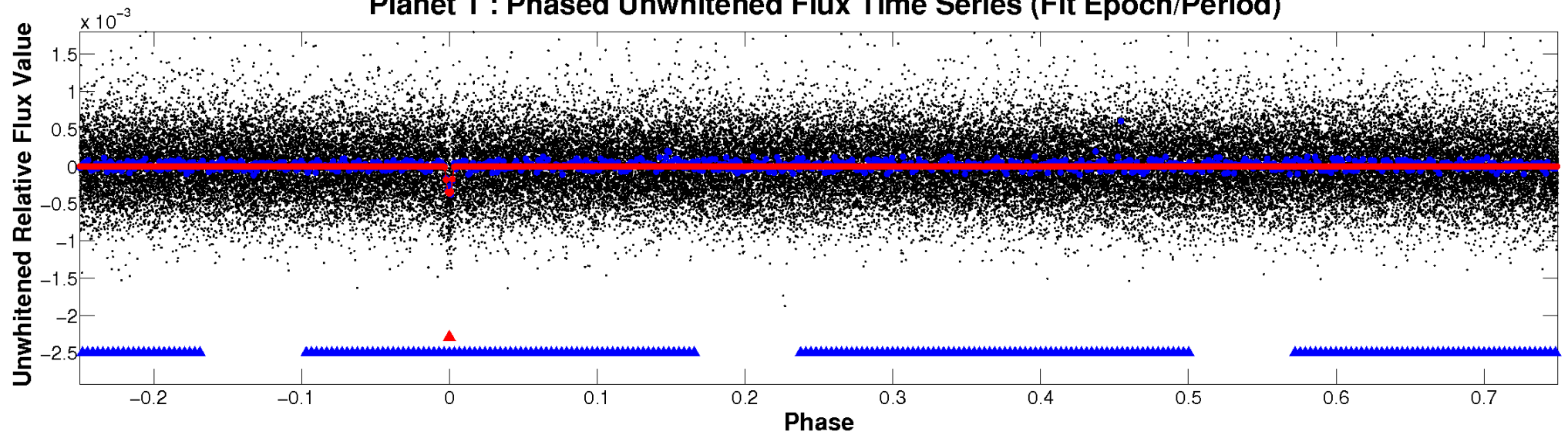
TCE 005903749-01



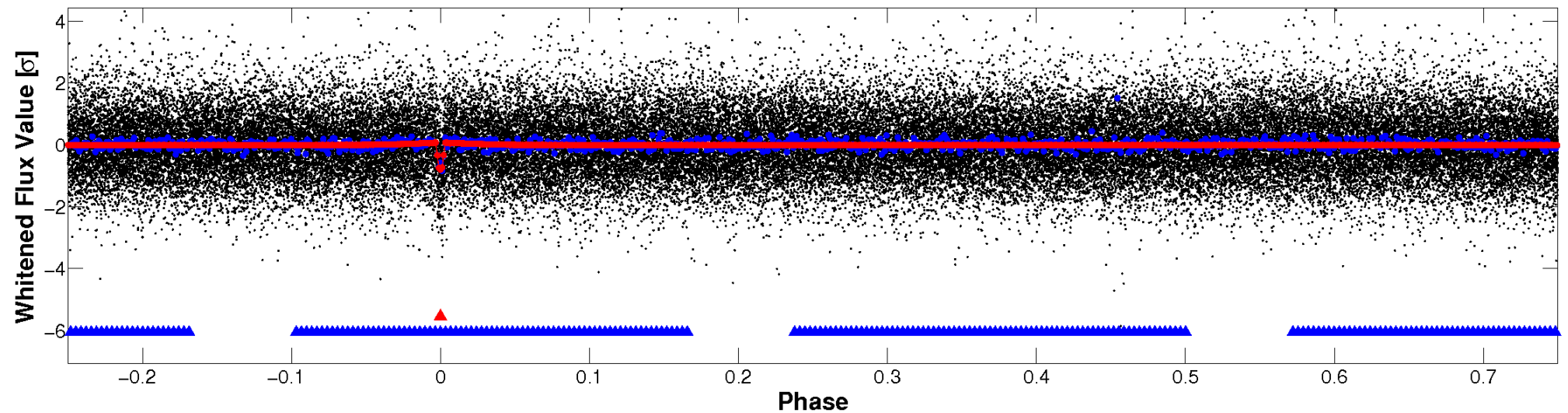


# Non-Whitened Vs. Whitened Light Curve

Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

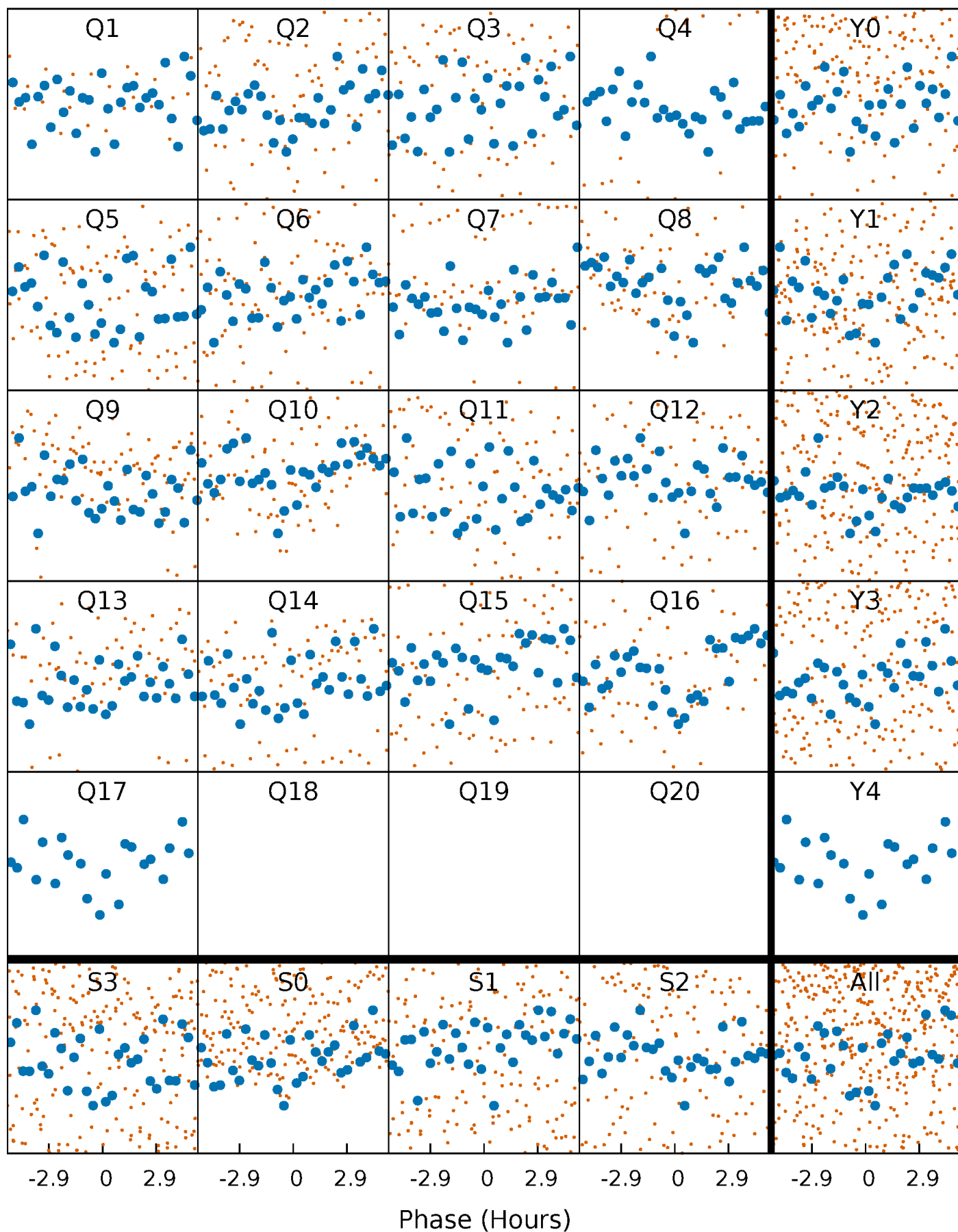


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

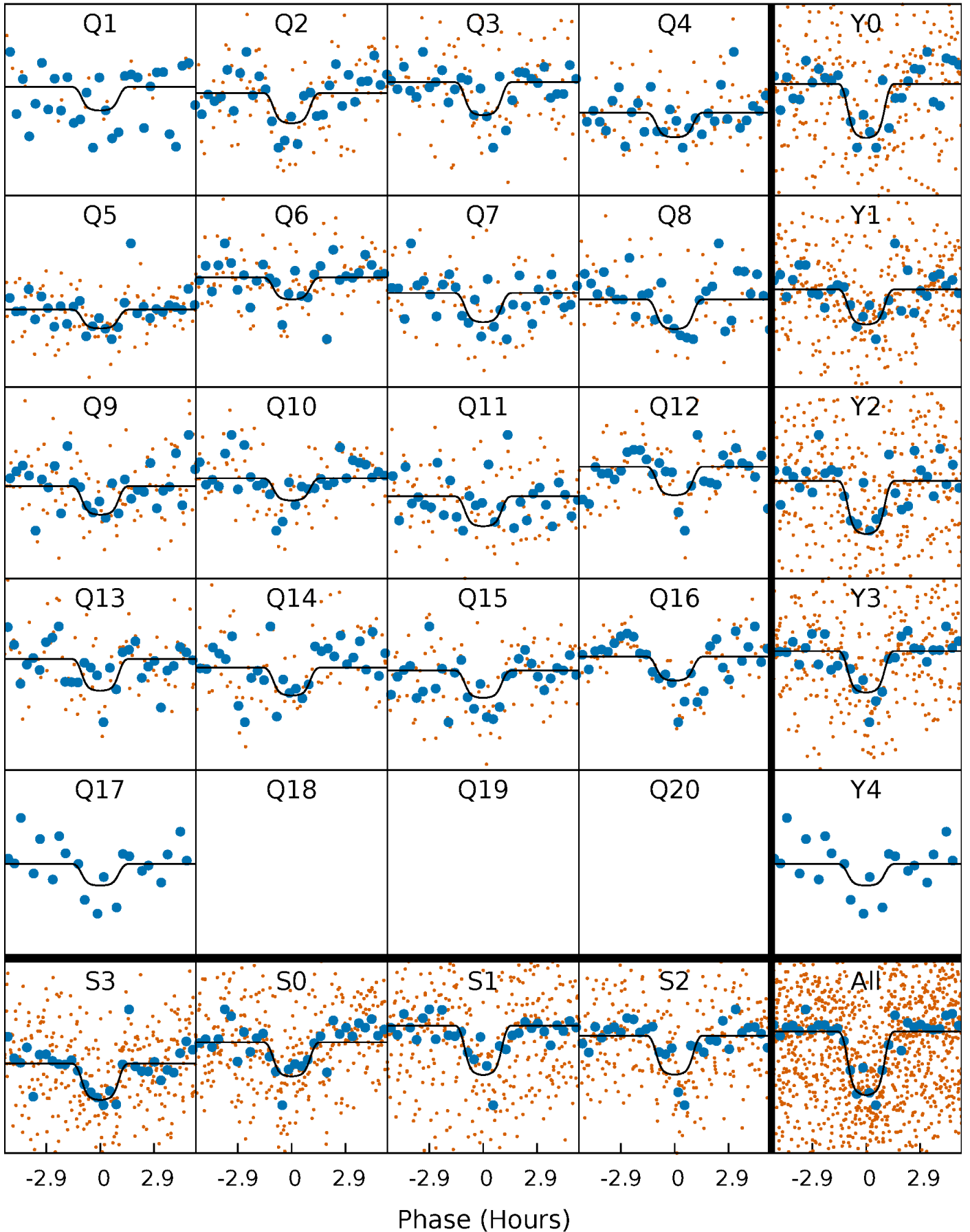
TCE 005903749-01 P= 18.976293 Days  $T_0=134.834764$  (BKJD)





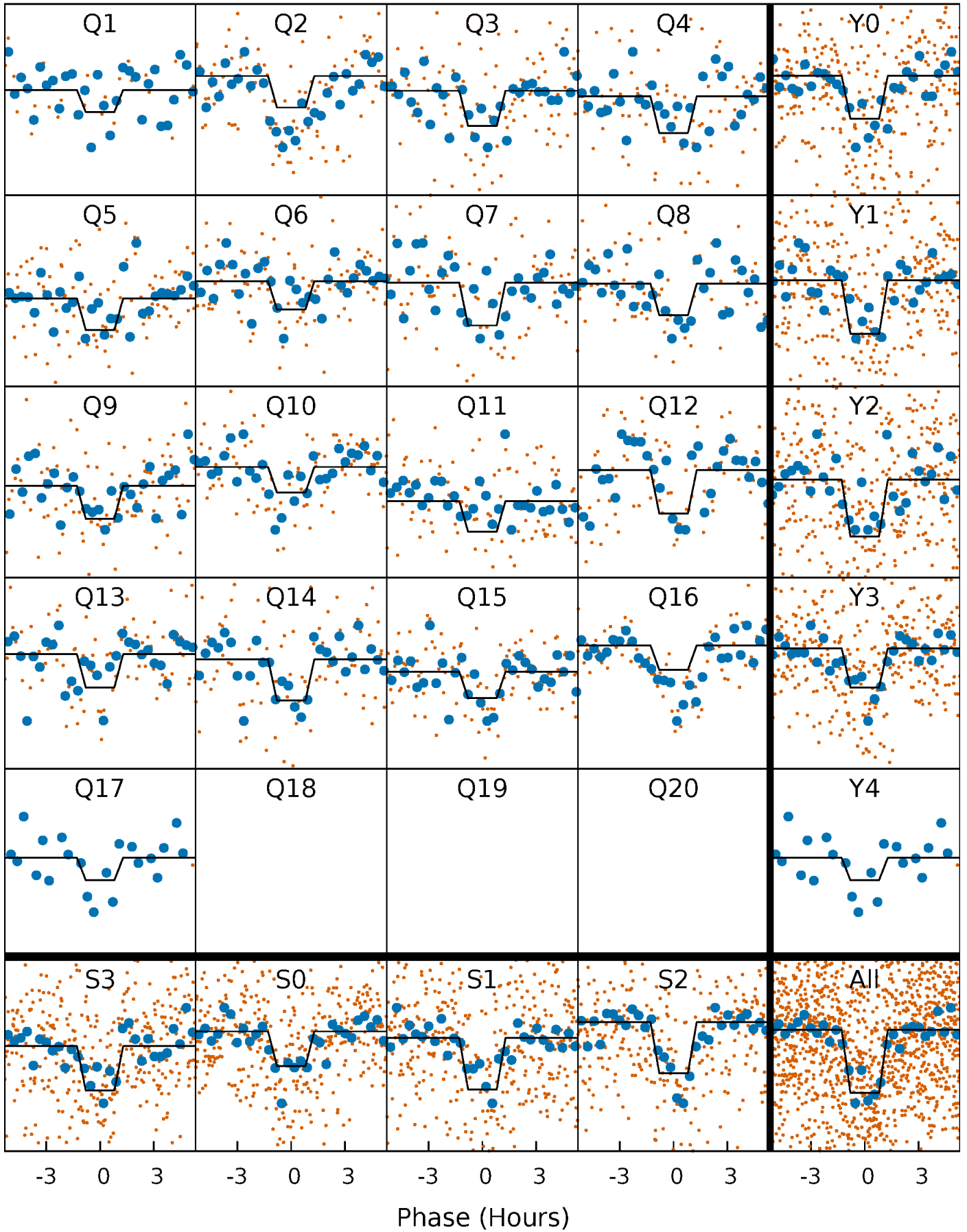
# DV Quarter-Phased Transit Curves

TCE 005903749-01 P= 18.976293 Days  $T_0=134.834764$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

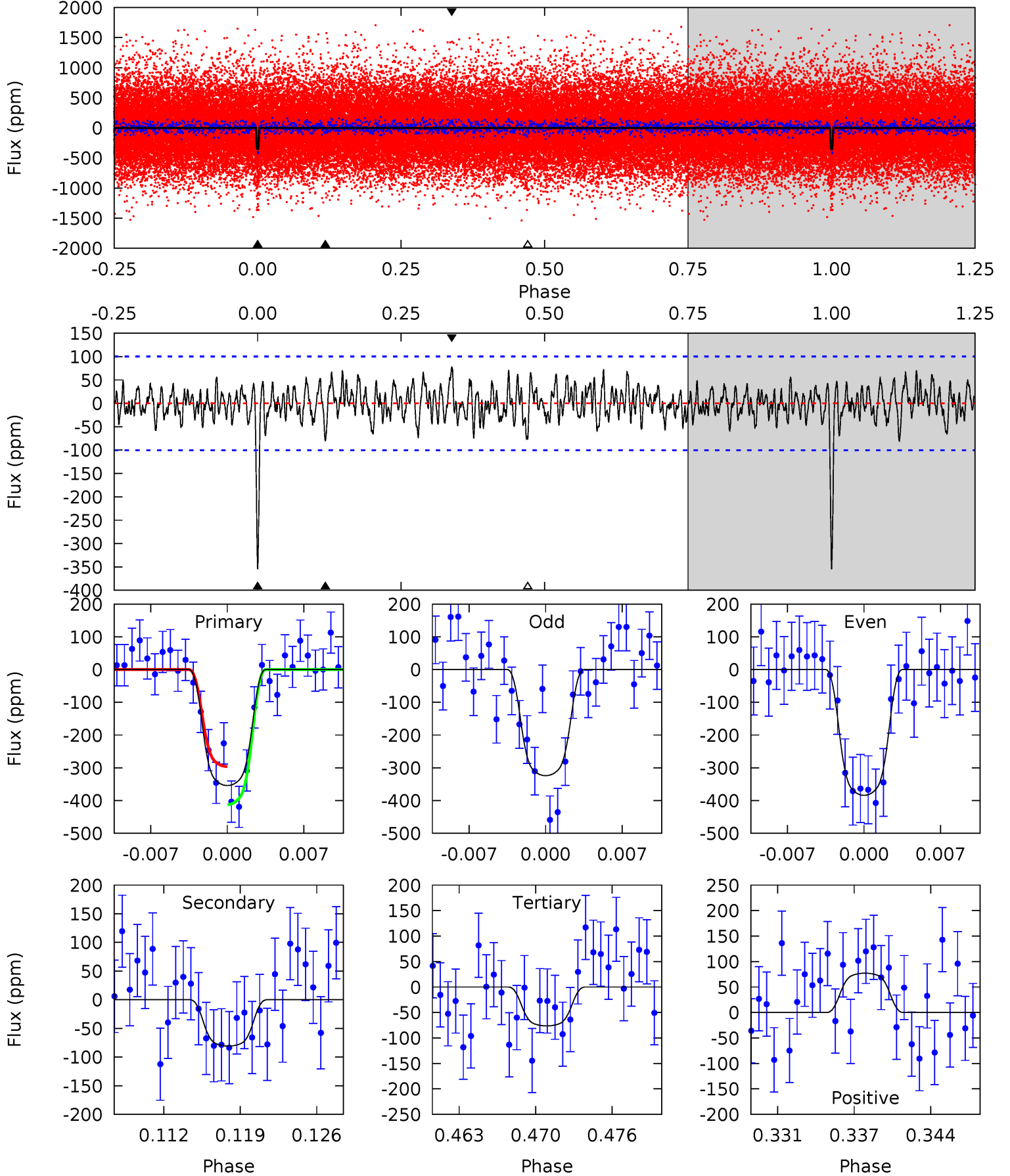
TCE 005903749-01 P= 18.976254 Days  $T_0=134.838275$  (BKJD)



# DV Model-Shift Uniqueness Test

005903749-01,  $P = 18.976293$  Days,  $E = 115.858471$  Days

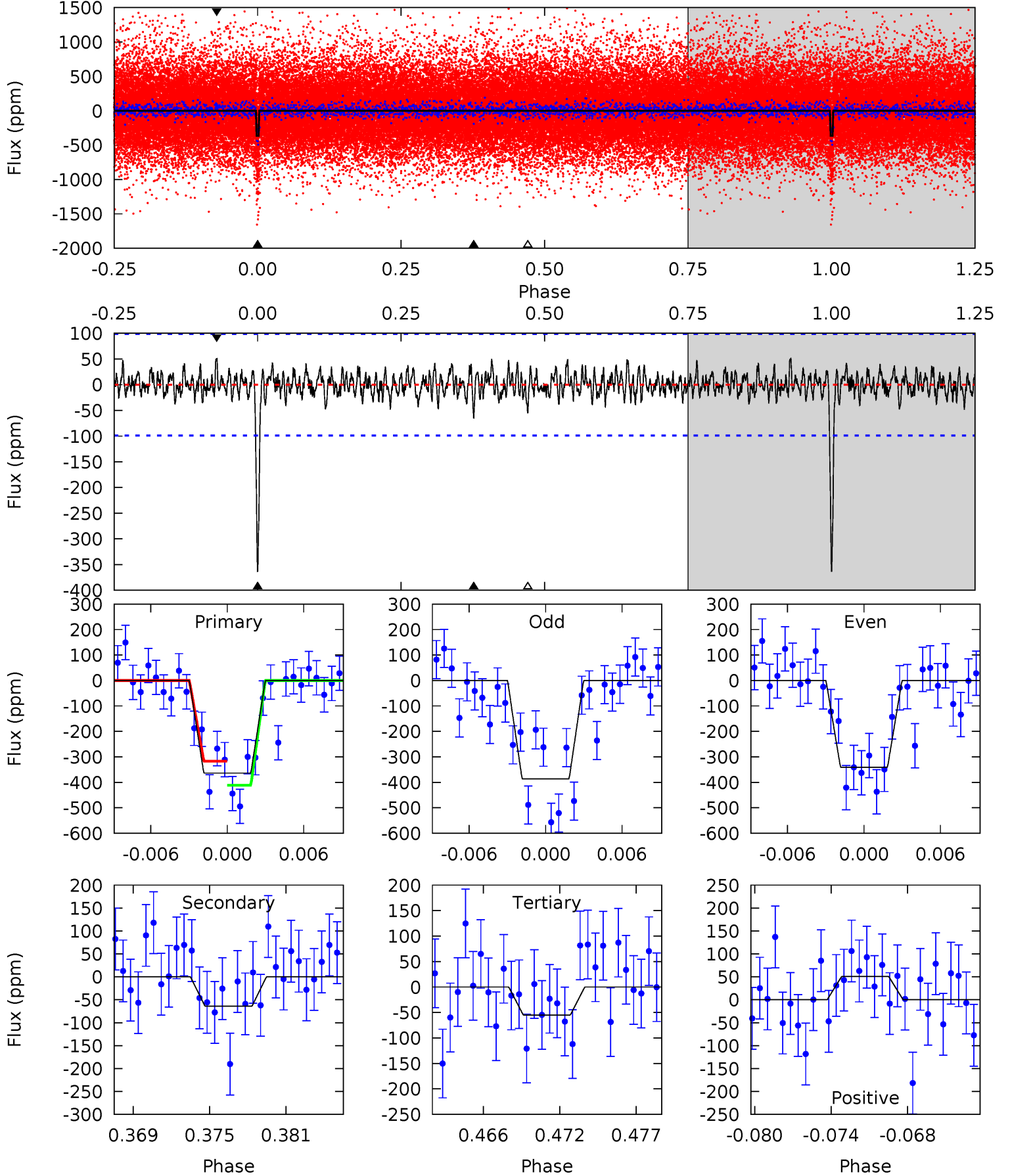
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.0	4.11	3.88	3.93	5.11	2.72	1.42	14.1	14.1	0.23	0.18	1.53	1.01	0.18	2.97



# Alt Model-Shift Uniqueness Test

005903749-01,  $P = 18.976254$  Days,  $E = 115.862021$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.9	3.33	2.86	2.65	5.13	2.77	0.93	16.1	16.3	0.46	0.68	1.19	1.14	0.12	2.47



### Stellar Parameters For KIC 005903749

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5300^{+79}_{-79}$	$4.385^{+0.126}_{-0.092}$	$0.180^{+0.150}_{-0.100}$	$0.986^{+0.120}_{-0.120}$	$0.861^{+0.059}_{-0.034}$	$1.264^{+0.692}_{-0.351}$
	+1%/-1%	+3%/-2%	+83%/-56%	+12%/-12%	+7%/-4%	+55%/-28%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 005903749-01 / KOI 3029.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-81 \pm 20$	$2.46^{+0.40}_{-0.35}$	$890^{+29}_{-35}$	$3683^{+241}_{-214}$	$127^{+56}_{-41}$
Alt.	$-64 \pm 19$	$2.06^{+0.38}_{-0.34}$	$889^{+32}_{-33}$	$3769^{+312}_{-271}$	$145^{+89}_{-55}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

## DV Centroid Data

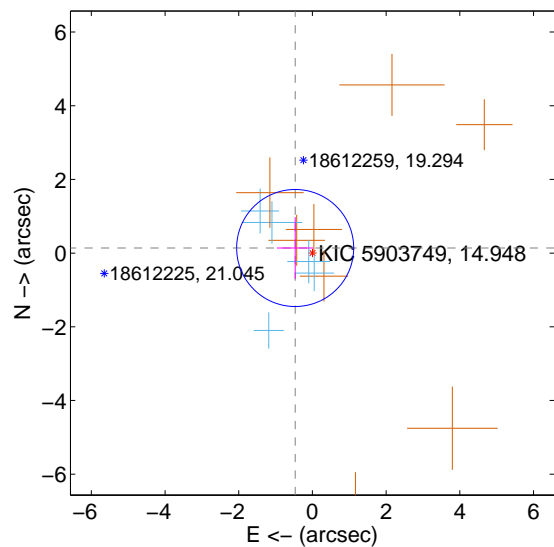
Supplemental centroid analysis for 005903749-01. Kepler magnitude: 14.95. Transit SNR 11.42

There are 5 quarters with good PRF difference image offsets

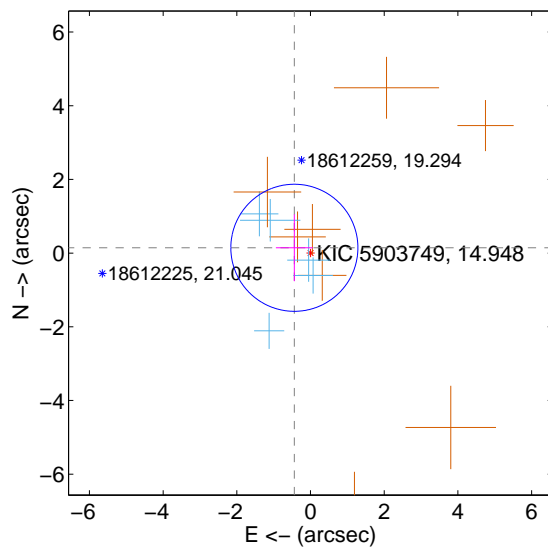
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.489 \pm 0.529$	0.92	$0.469 \pm 0.495$	$0.138 \pm 0.835$
PRF-fit source offset from KIC position	$0.462 \pm 0.575$	0.80	$0.439 \pm 0.501$	$0.144 \pm 0.907$
photometric centroid source offset	$2.07 \pm 1.14$	1.82	$1.93 \pm 1.15$	$-0.75 \pm 1.06$

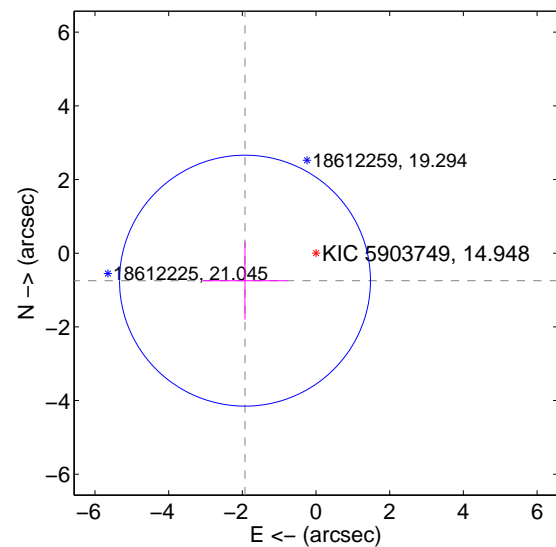
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



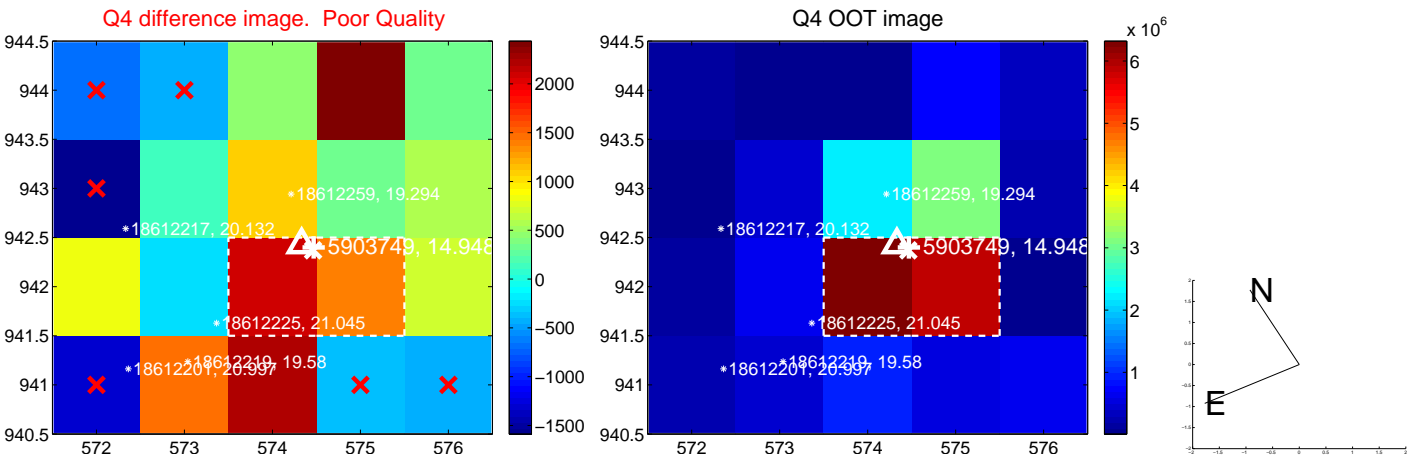
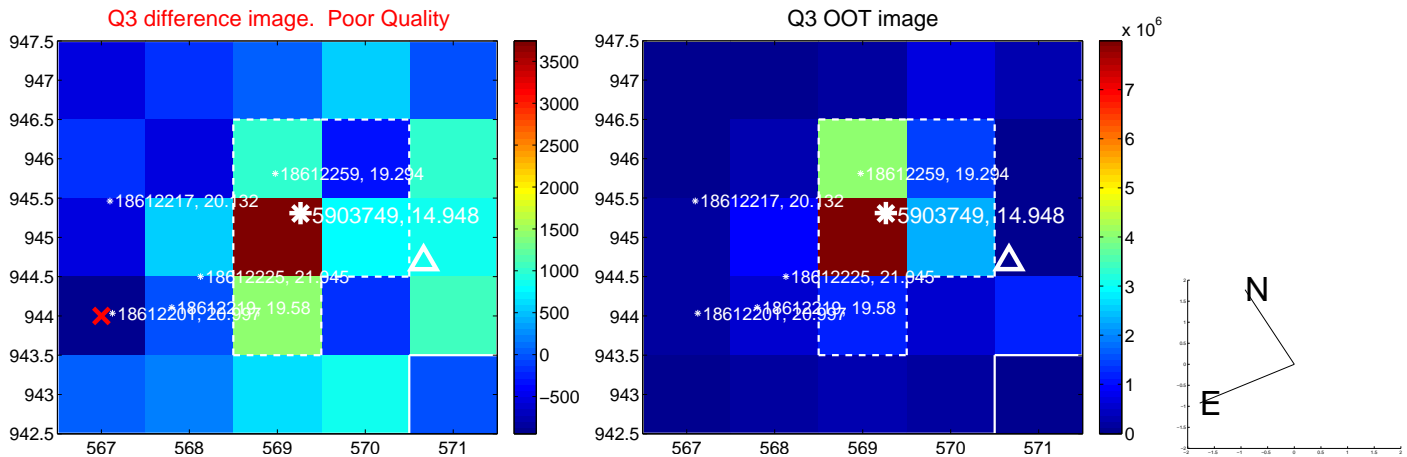
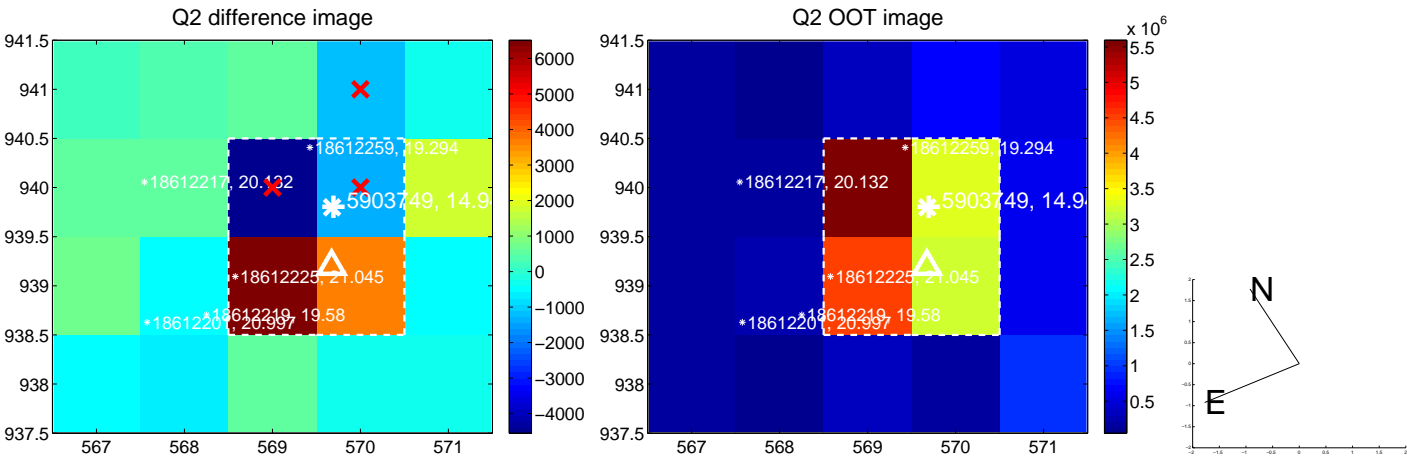
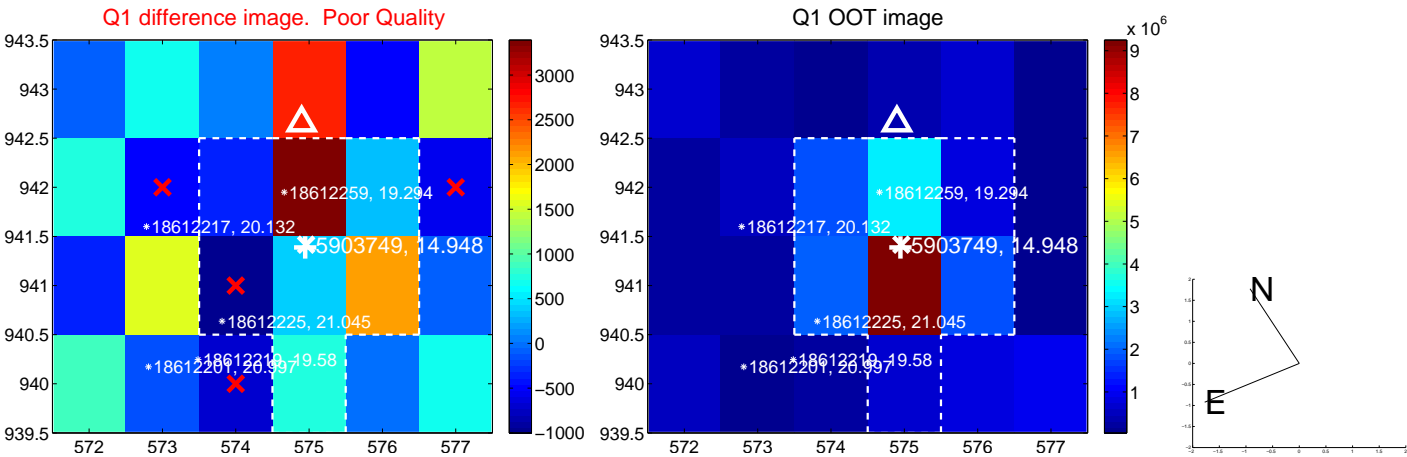
offset from photometric centroids



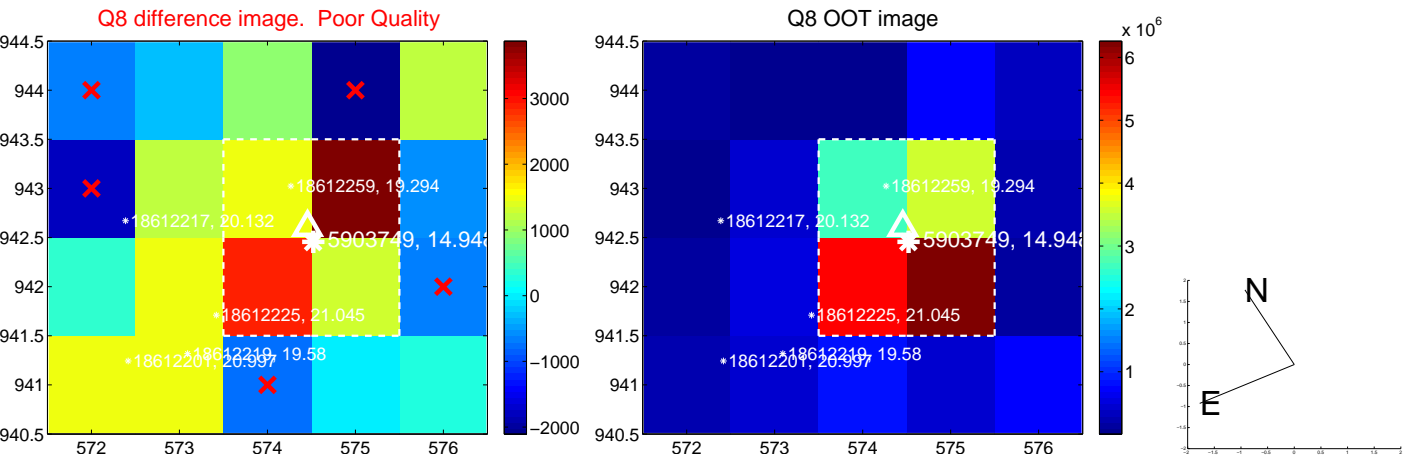
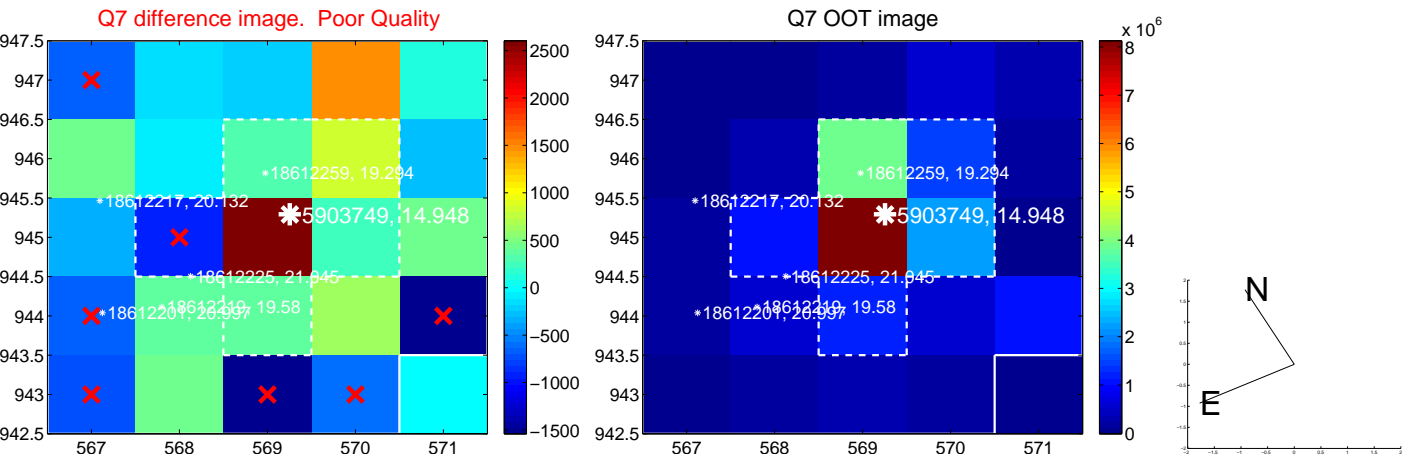
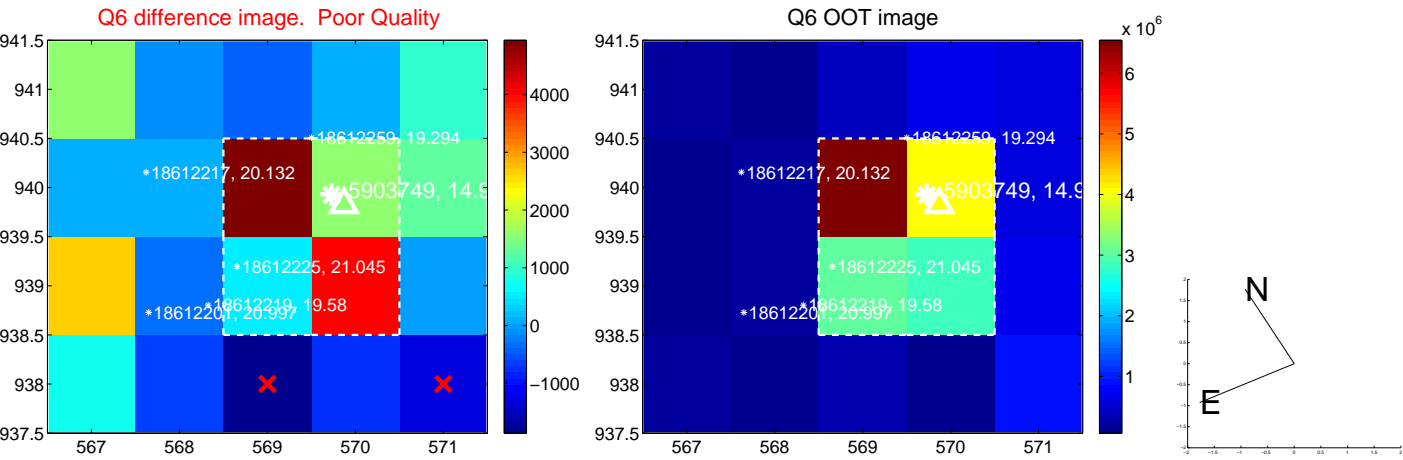
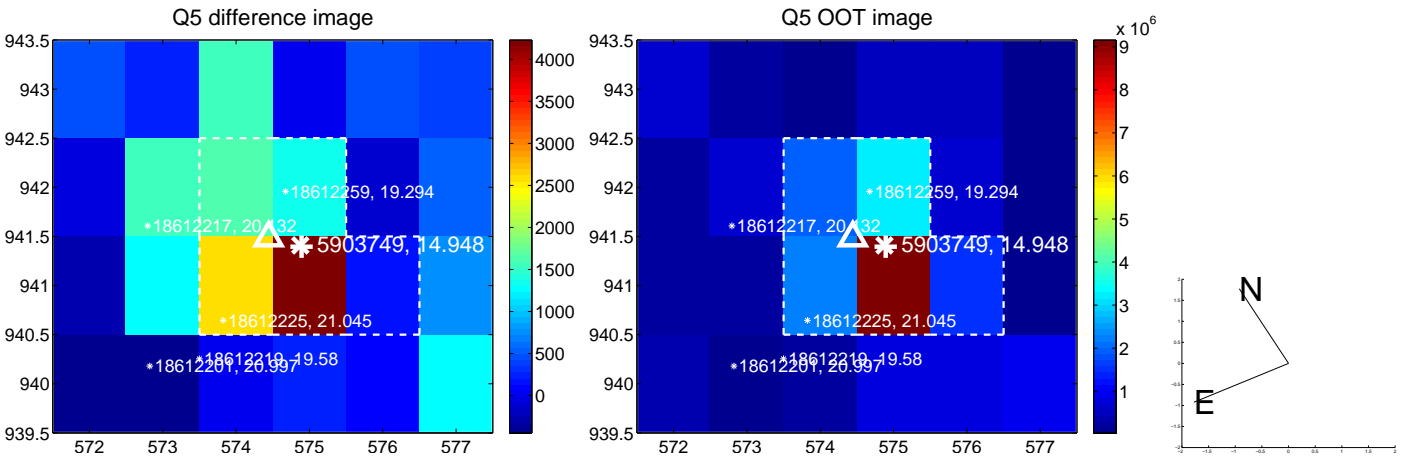
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.



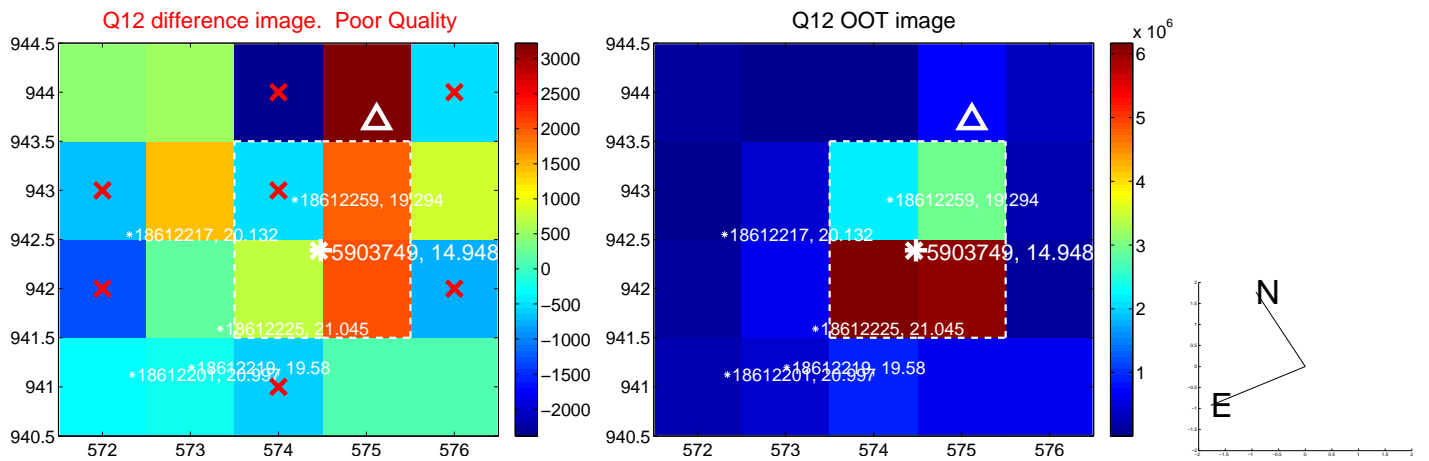
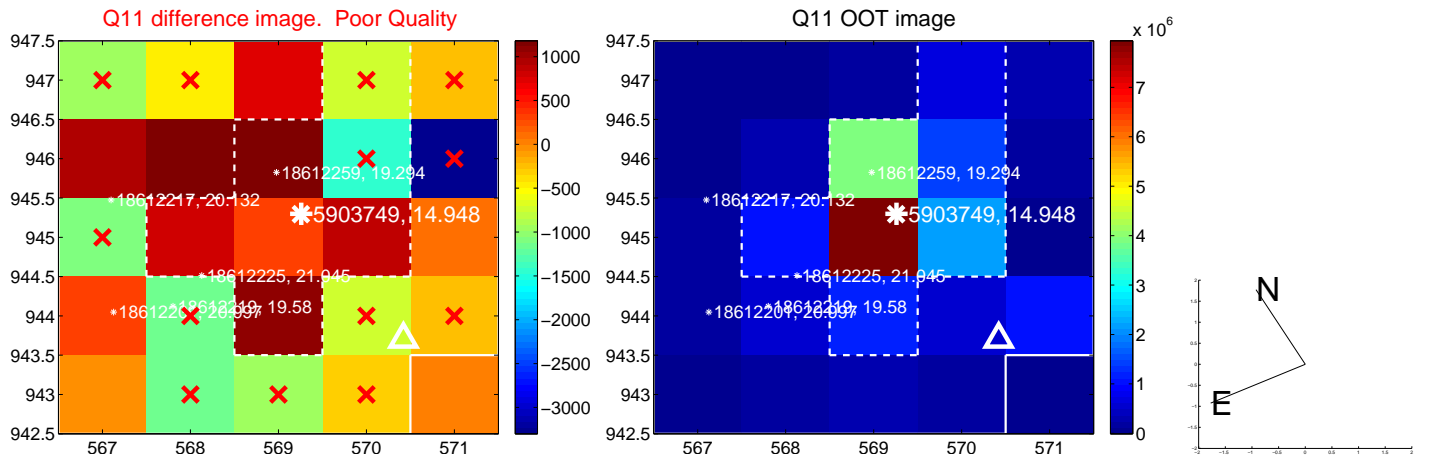
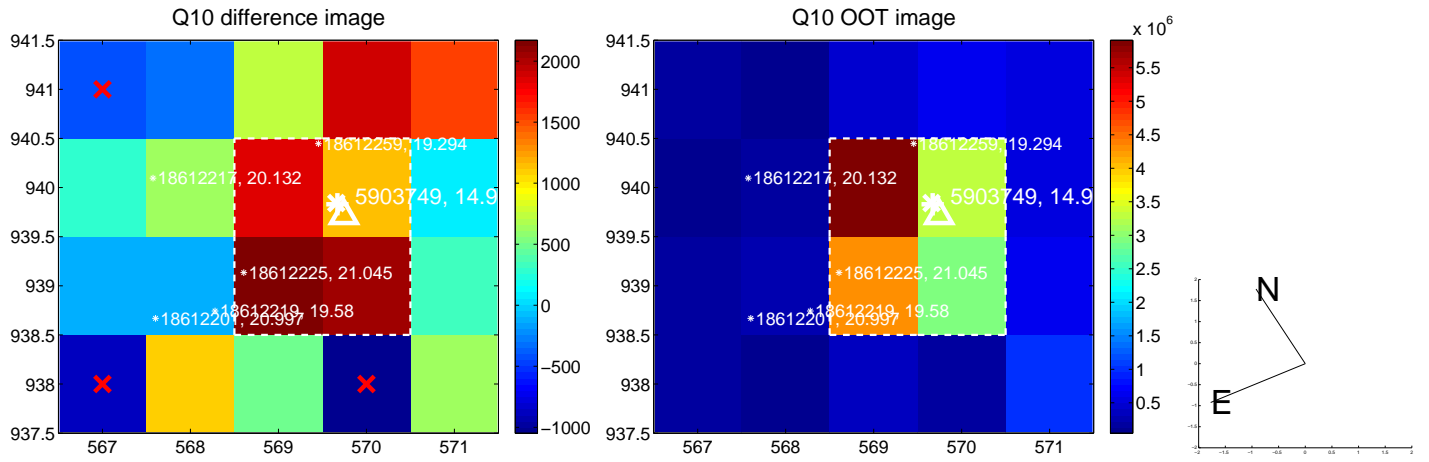
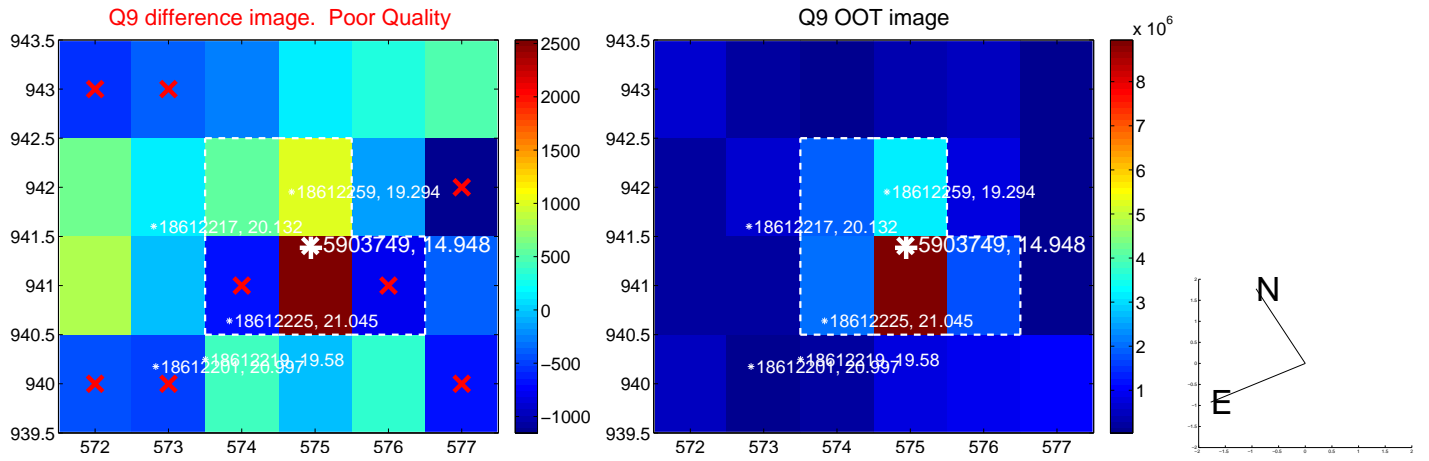
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



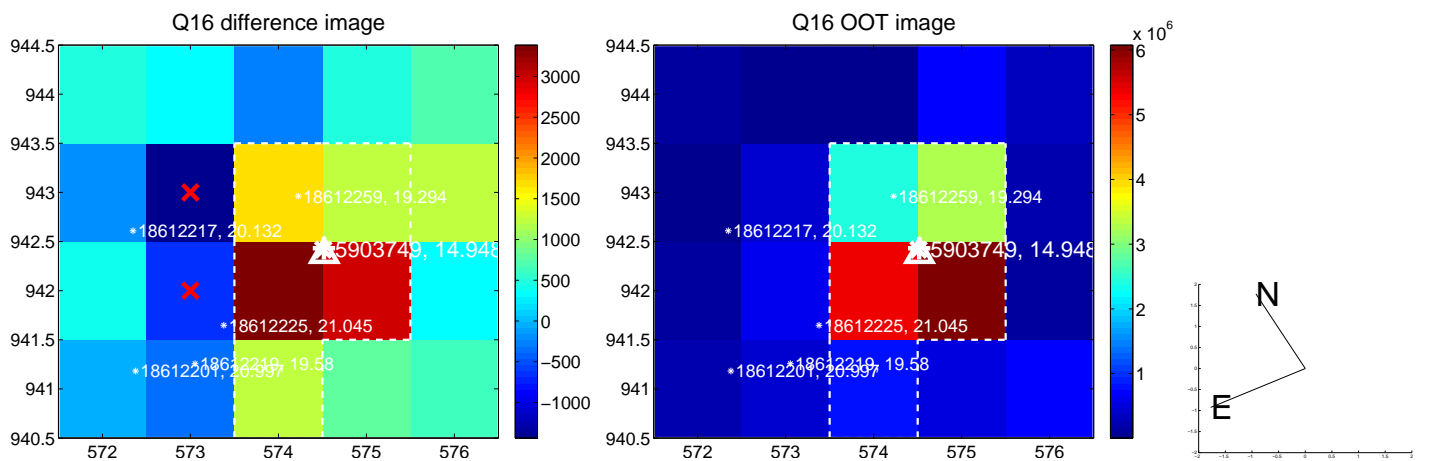
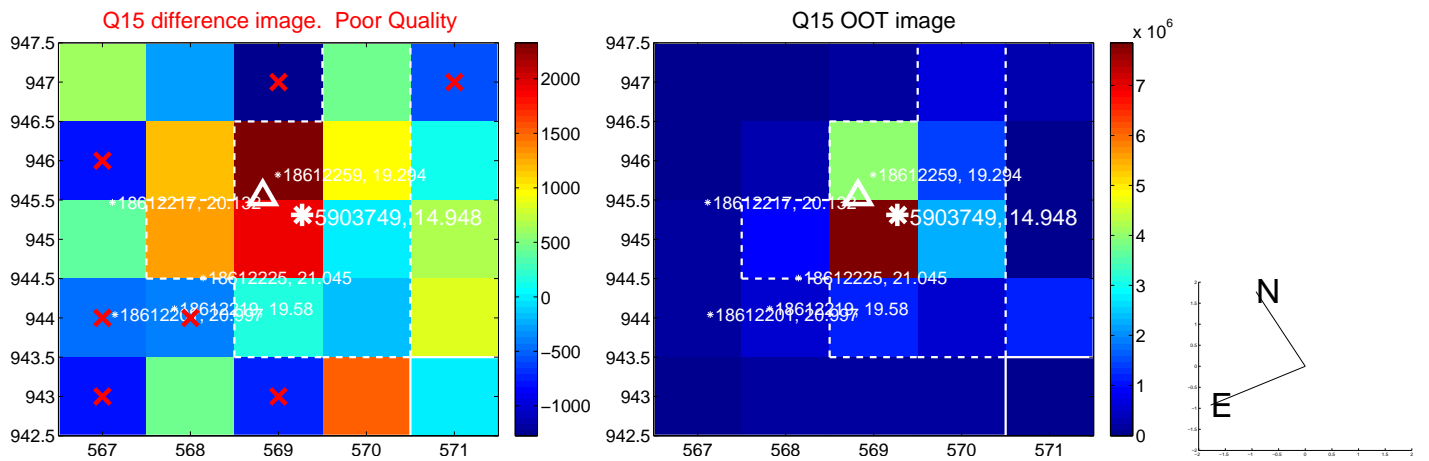
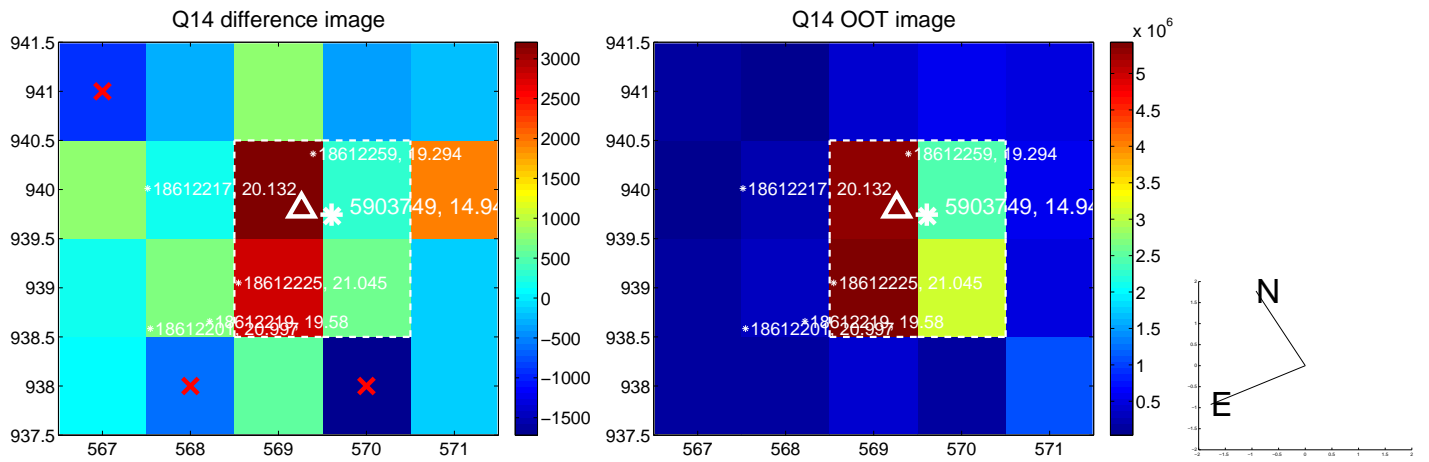
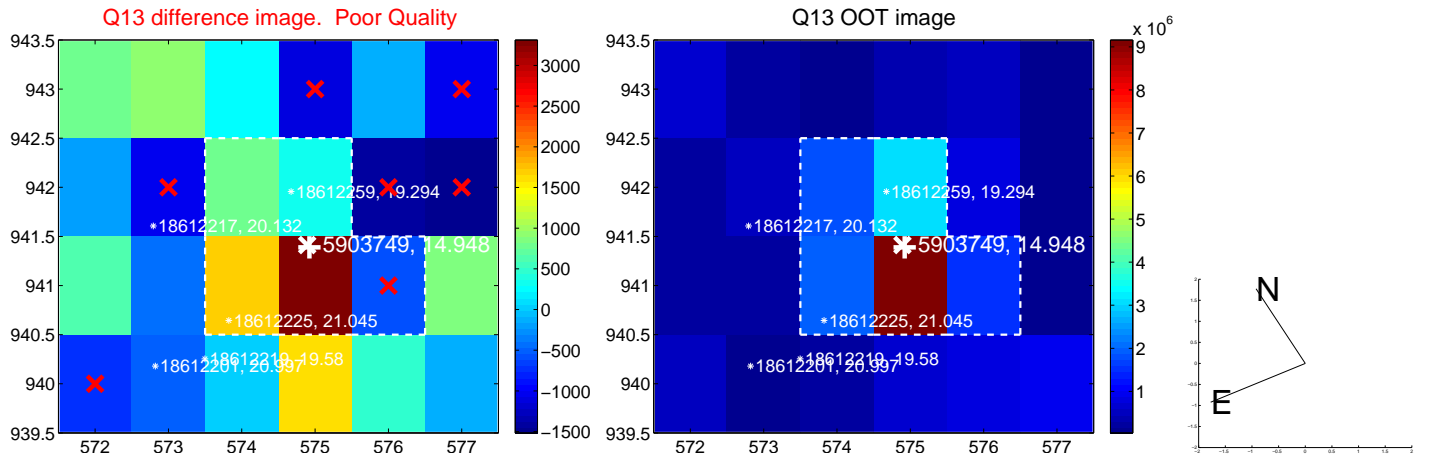
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



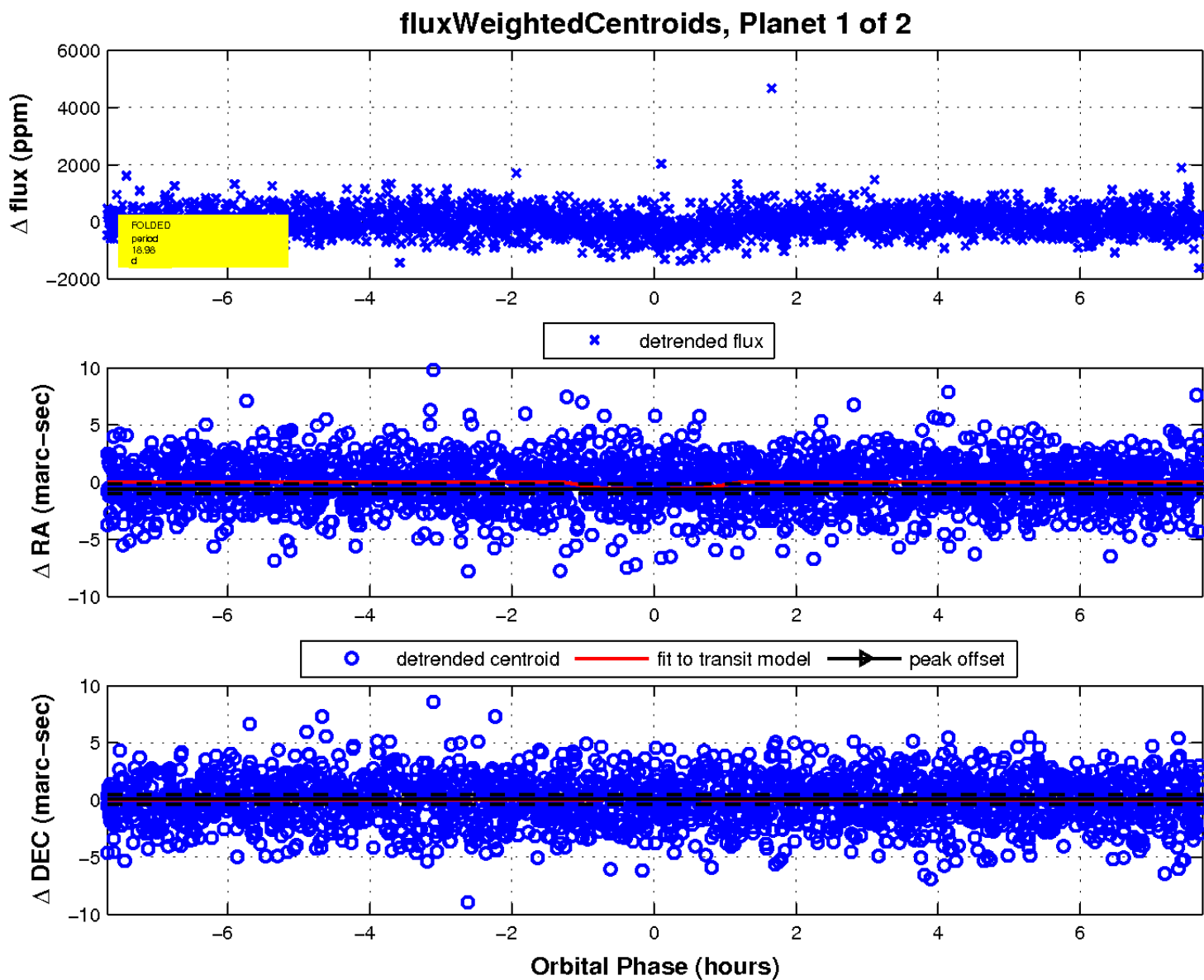
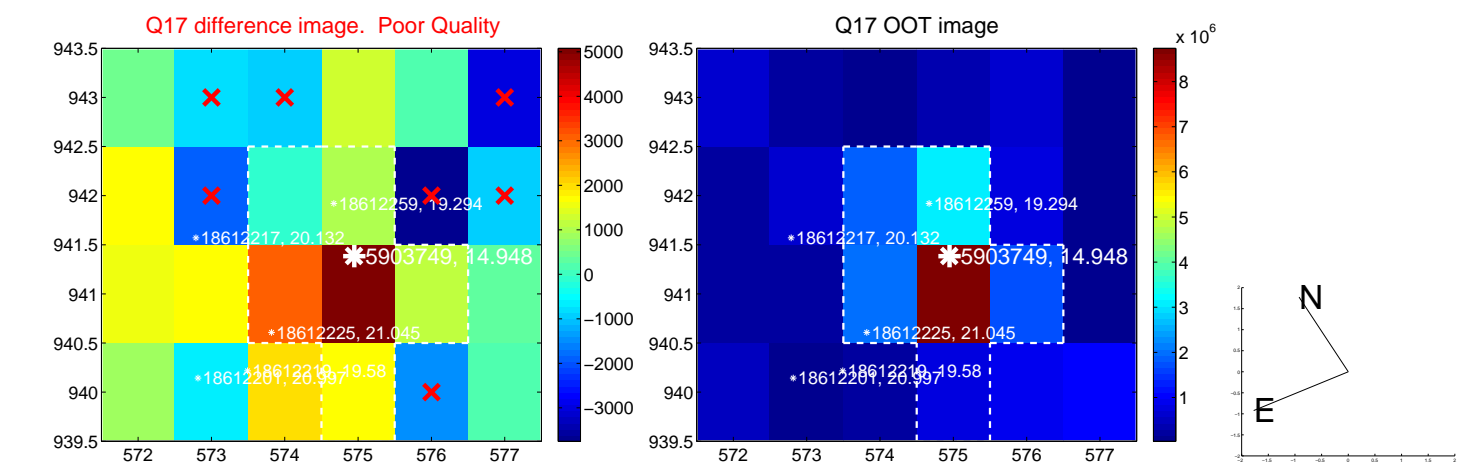
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

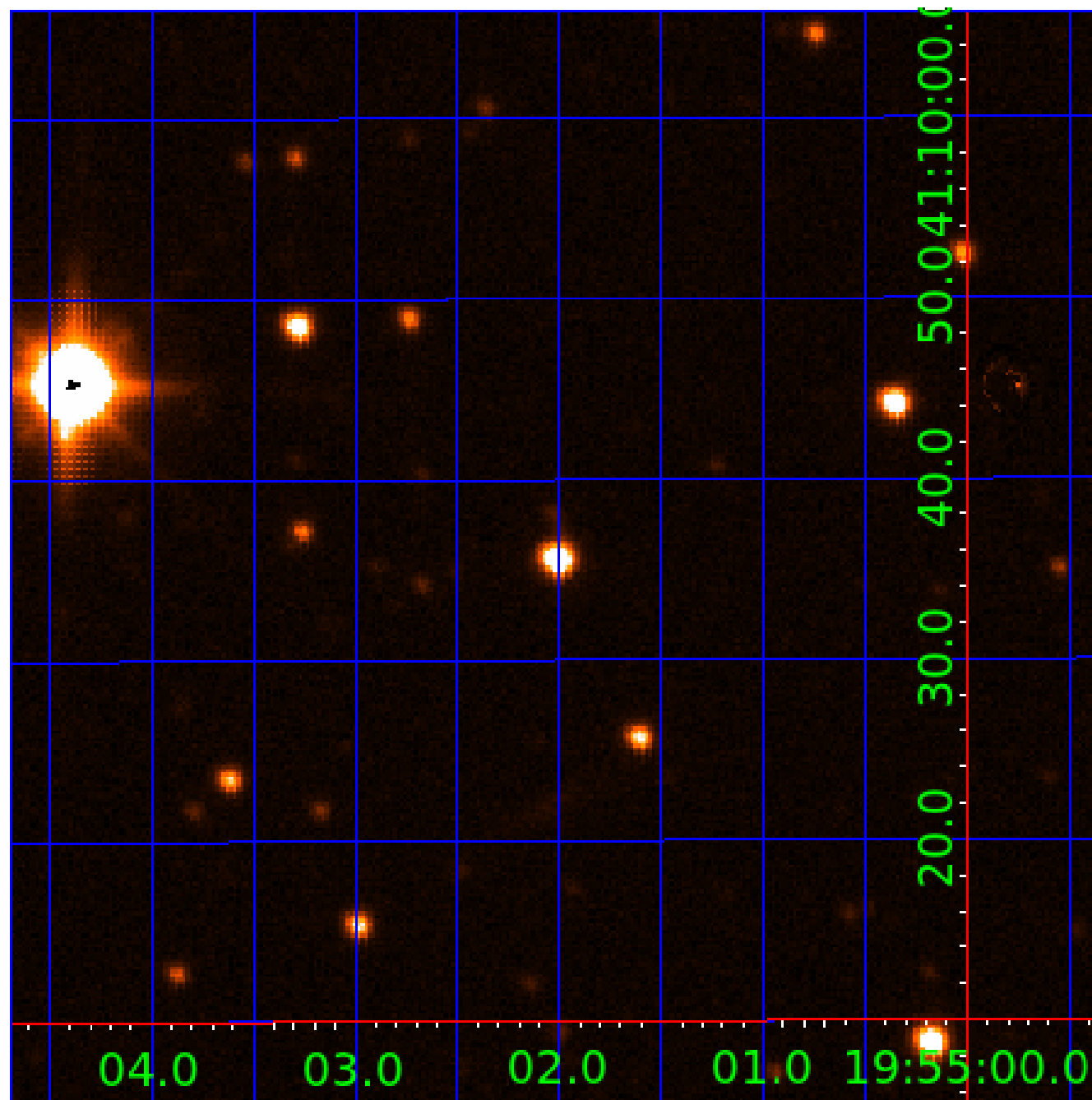


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005903749

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005903749-01	OBS	3029.01	18.976293	134.834764	367.7	2.575	10.2	11.4	0.99	5300	2.49	39.17
005903749-02	OBS	3029.02	6.347276	132.998375	142.9	3.347	8.6	9.2	0.99	5300	1.42	168.71

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005903749-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
005903749-02	OBS	PC	0.98	0	0	0	0	NO_COMMENT

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

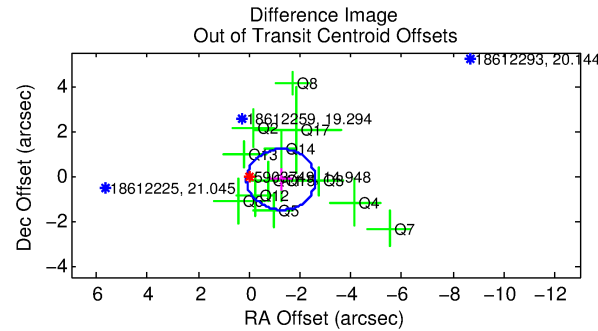
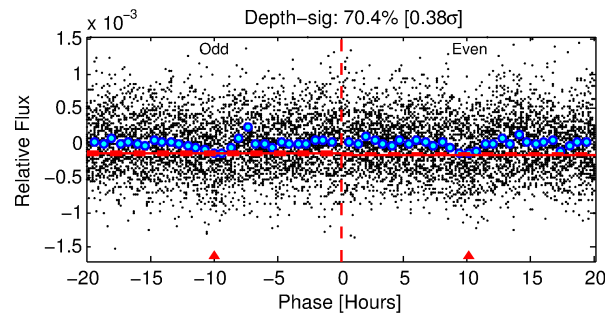
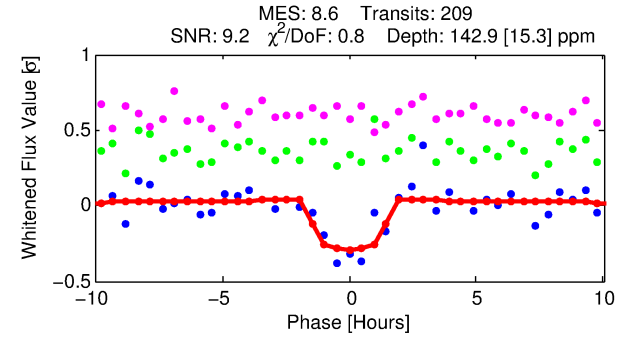
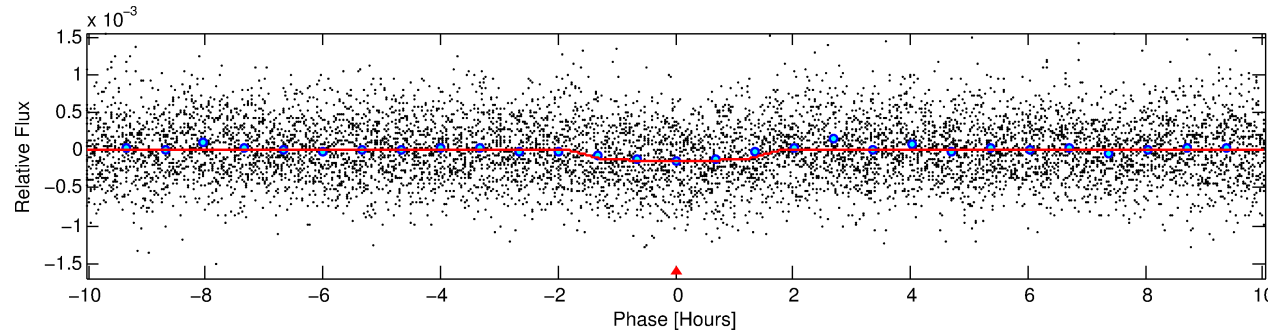
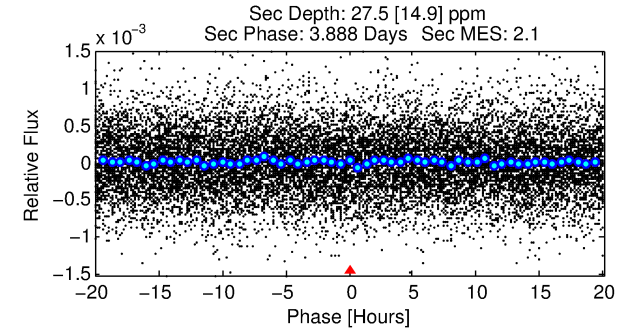
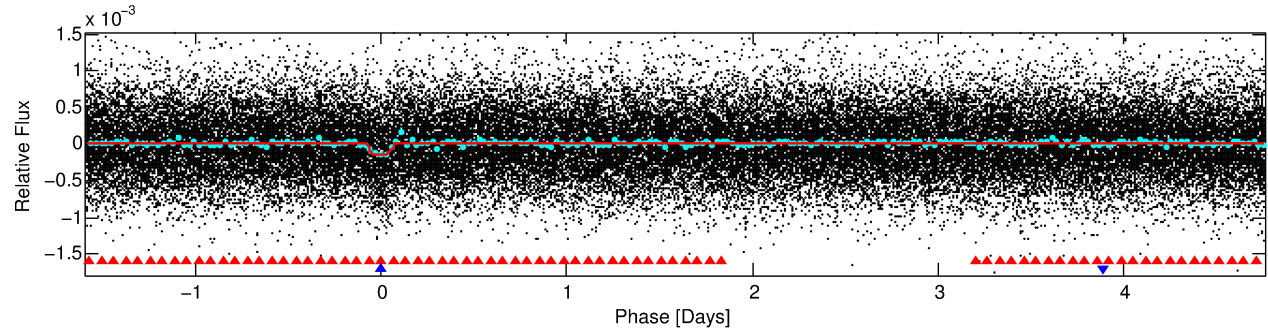
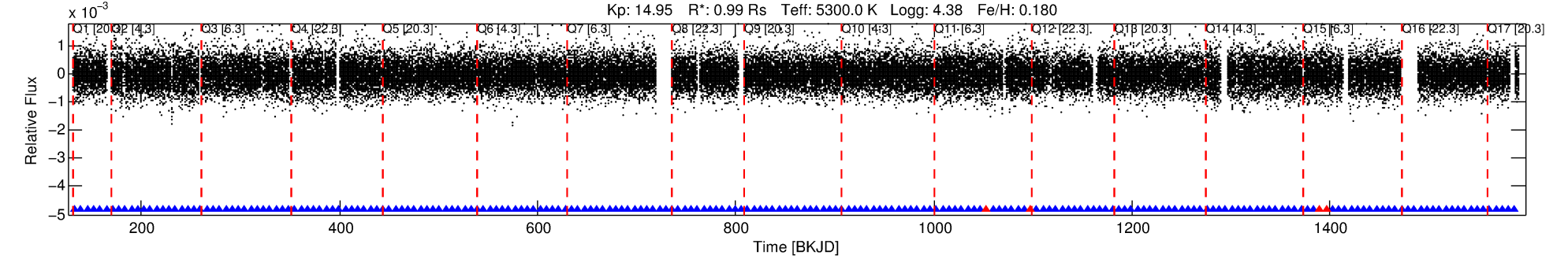
## Ephemeris Match Information For 005903749-02

No Significant Match Found

# DV One-Page Summary

KIC: 5903749 Candidate: 2 of 2 Period: 6.347 d

KOI: K03029.02 Corr: 0.989



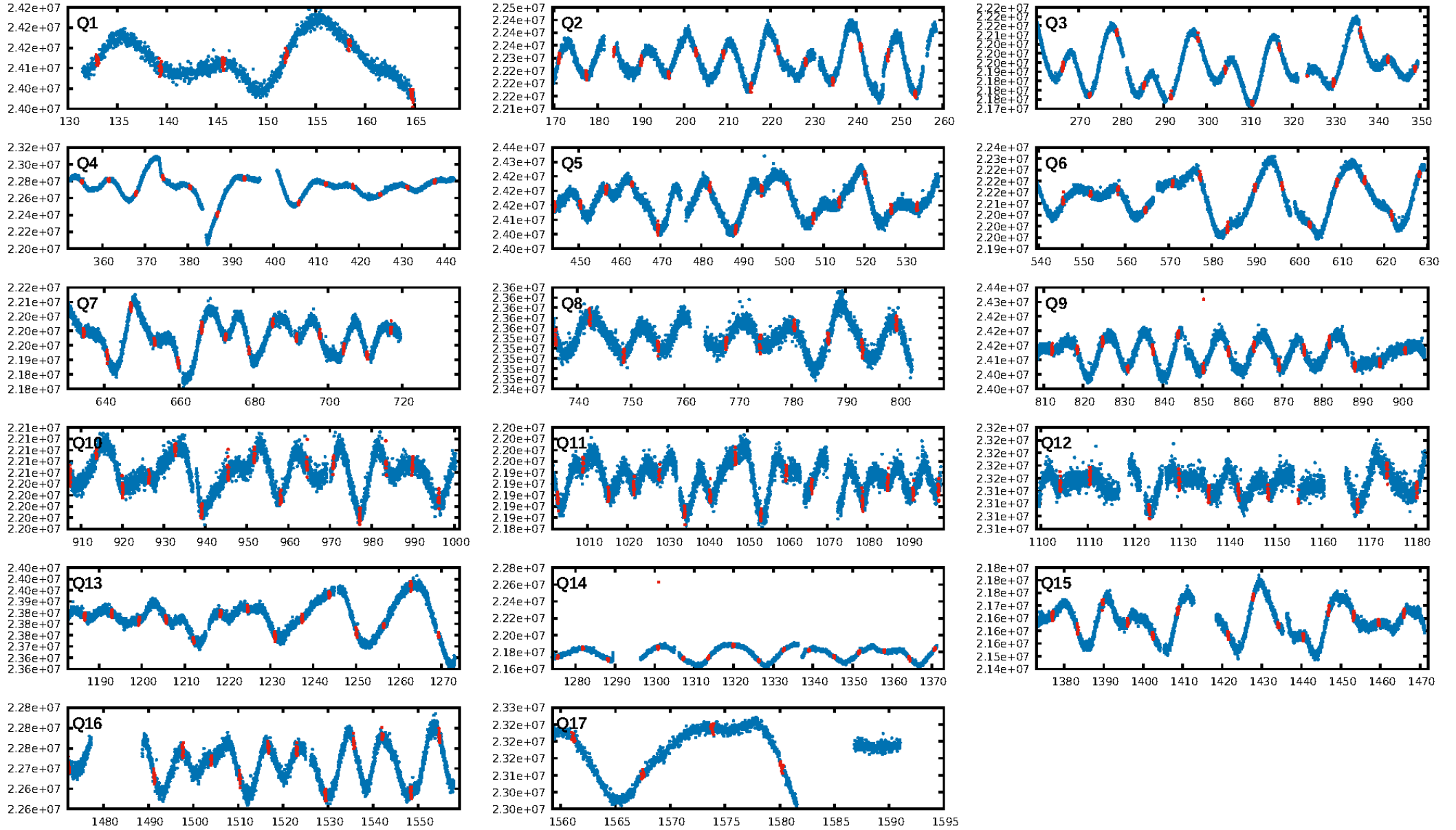
## DV Fit Results:

Period = 6.34728 [0.00005] d  
Epoch = 132.9984 [0.0060] BKJD  
Rp/R\* = 0.0132 [0.0083]  
a/R\* = 6.85 [17.69]  
b = 0.90 [0.58]  
Seff = 168.71 [36.79]  
Teff = 919 [50] K  
Rp = 1.42 [0.90] Re  
a = 0.0638 [0.0081] AU  
Ag = 30.44 [41.94] [0.70σ]  
Teffp = 3337 [1137] K [2.12σ]

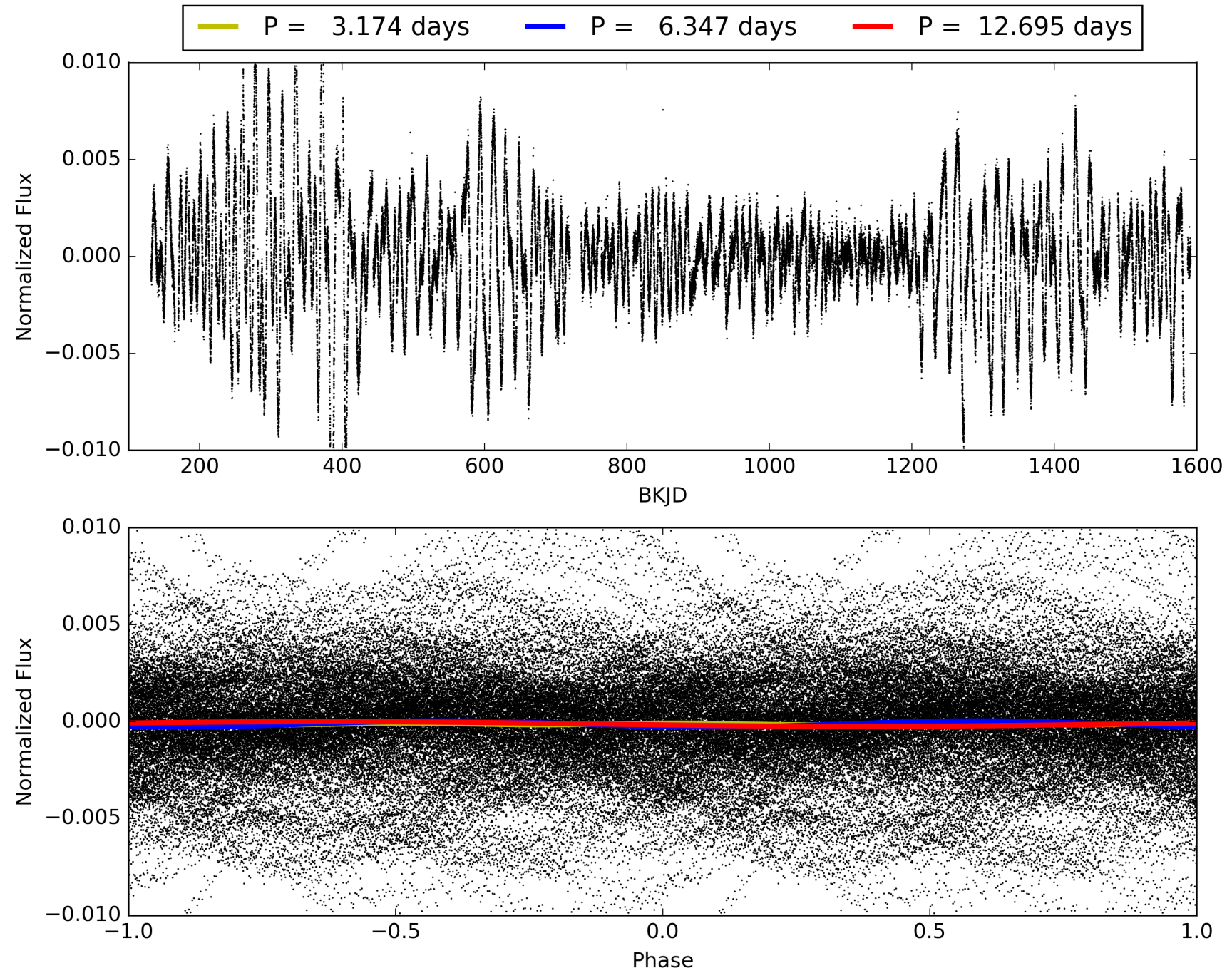
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [71.78σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.72e-17  
RollingBand-fgt: 0.98 [195/199]  
GhostDiagnostic-chr: 2.213  
Centroid-sig: 12.8%  
Centroid-so: 0.736 arcsec [0.56σ]  
OotOffset-rm: 1.270 arcsec [2.82σ]  
KicOffset-rm: 1.303 arcsec [2.81σ]  
OotOffset-st: 3/4/3/3 [13]  
KicOffset-st: 3/4/3/3 [13]  
DiffImageQuality-fgm: 0.31 [4/13]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 005903749-02, PDC Light Curves

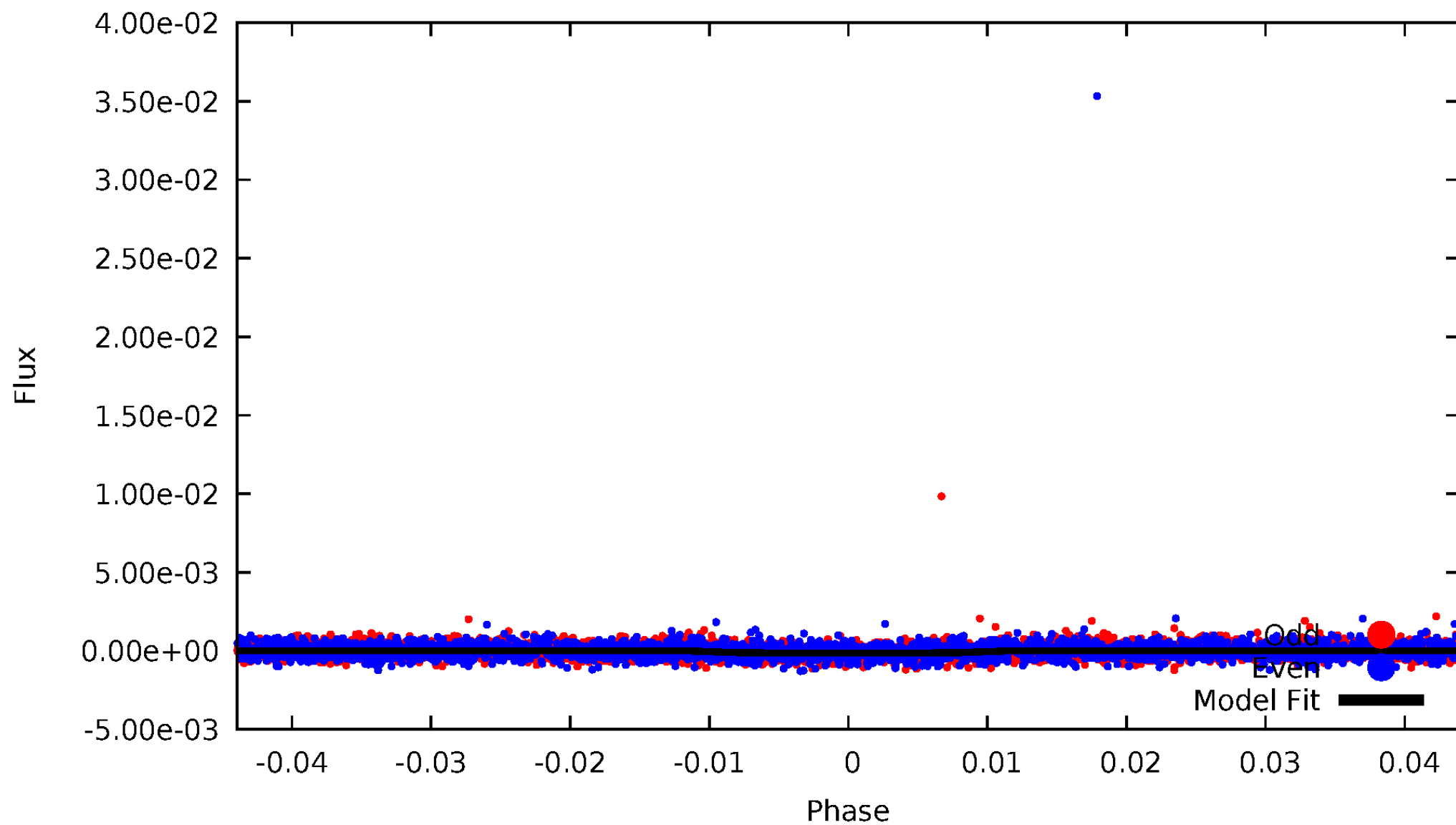


TCE 005903749-02



# DV Odd/Even

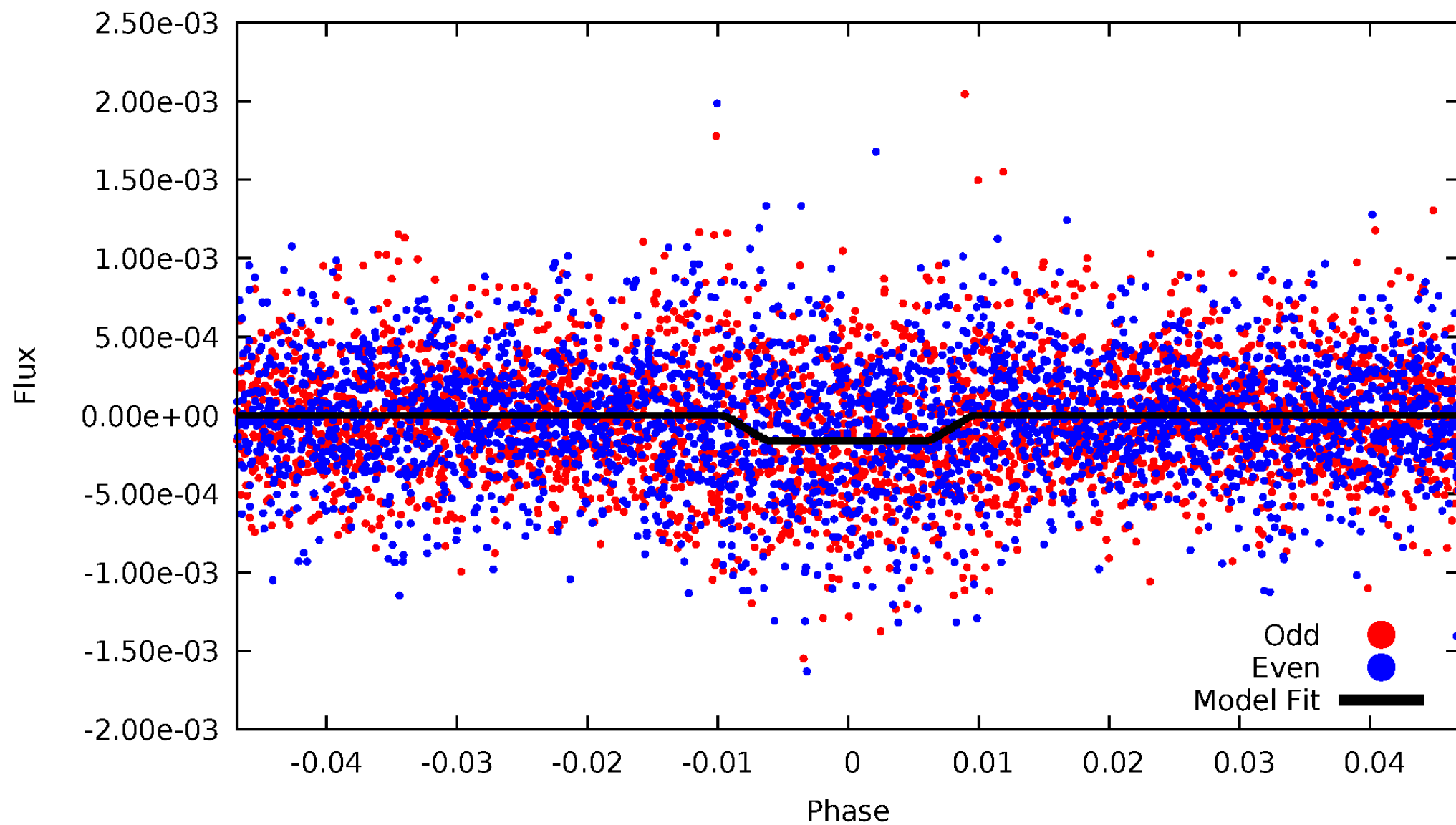
TCE 005903749-02





# ALT Odd/Even

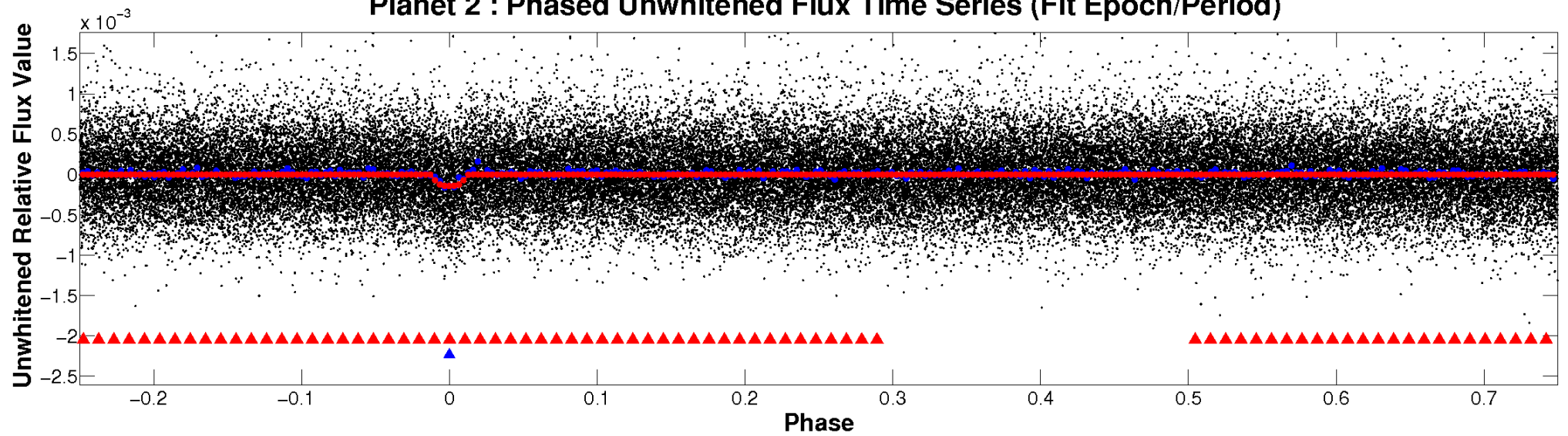
TCE 005903749-02



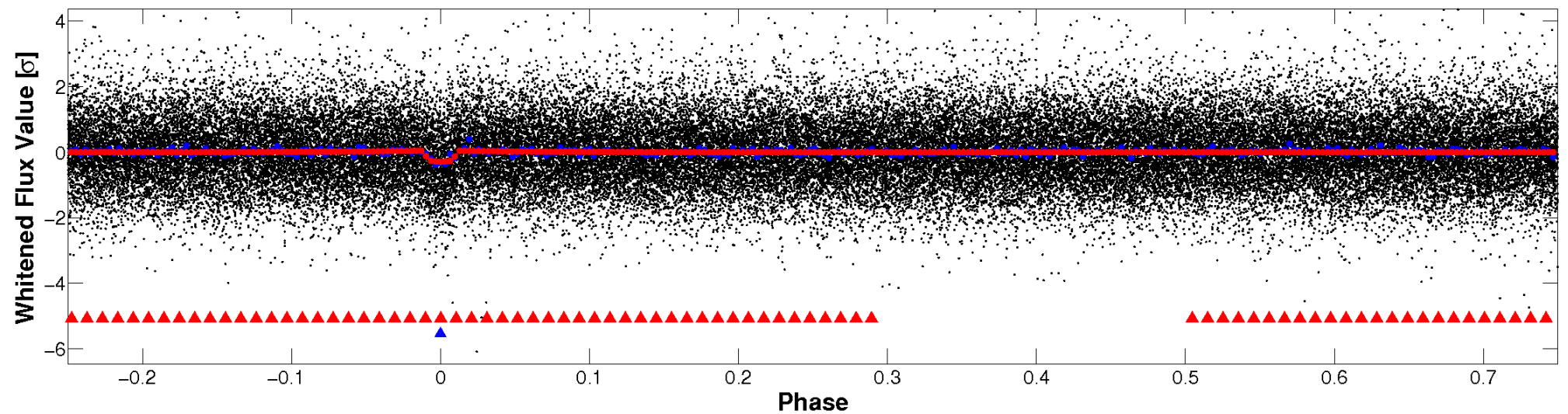


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

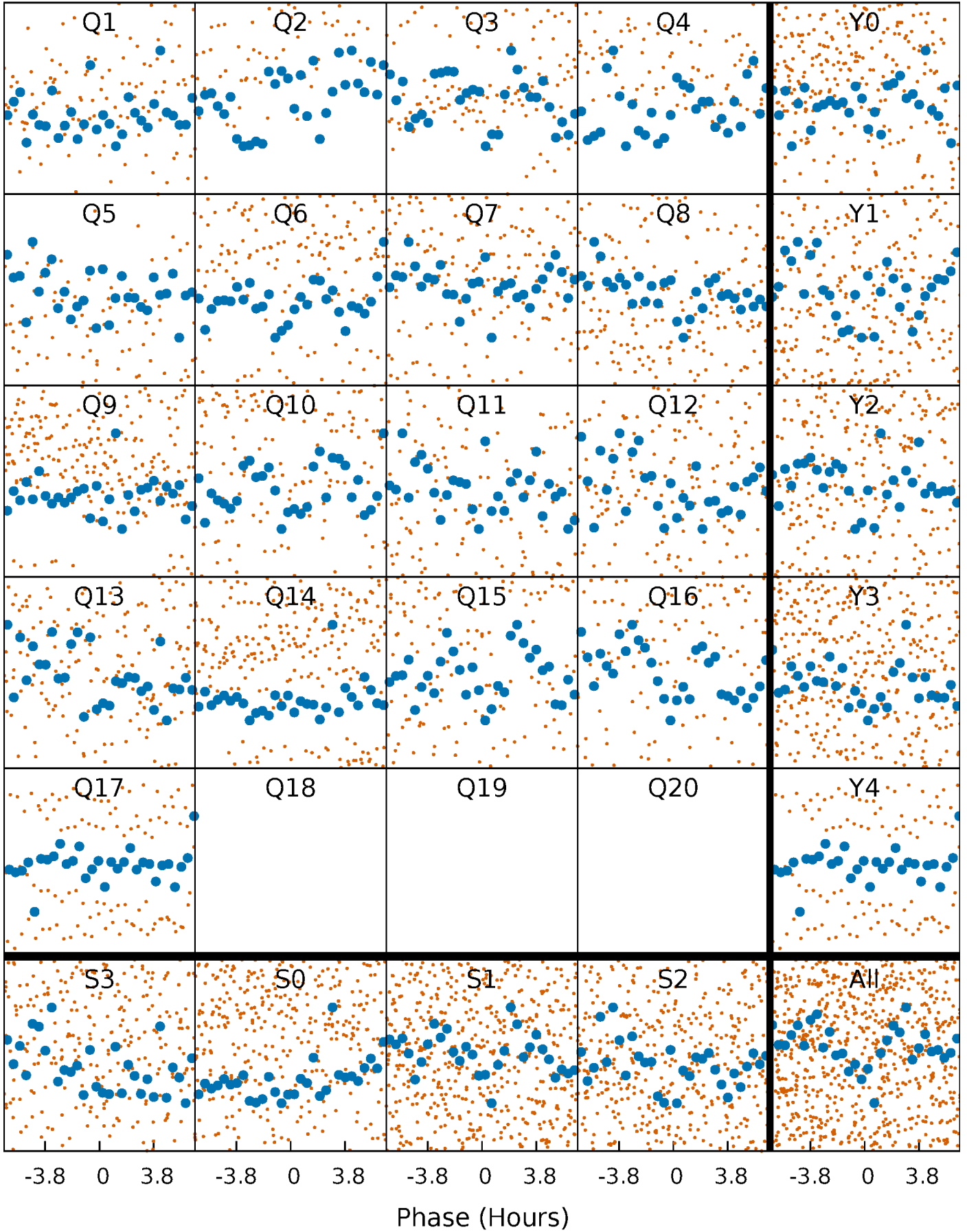


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



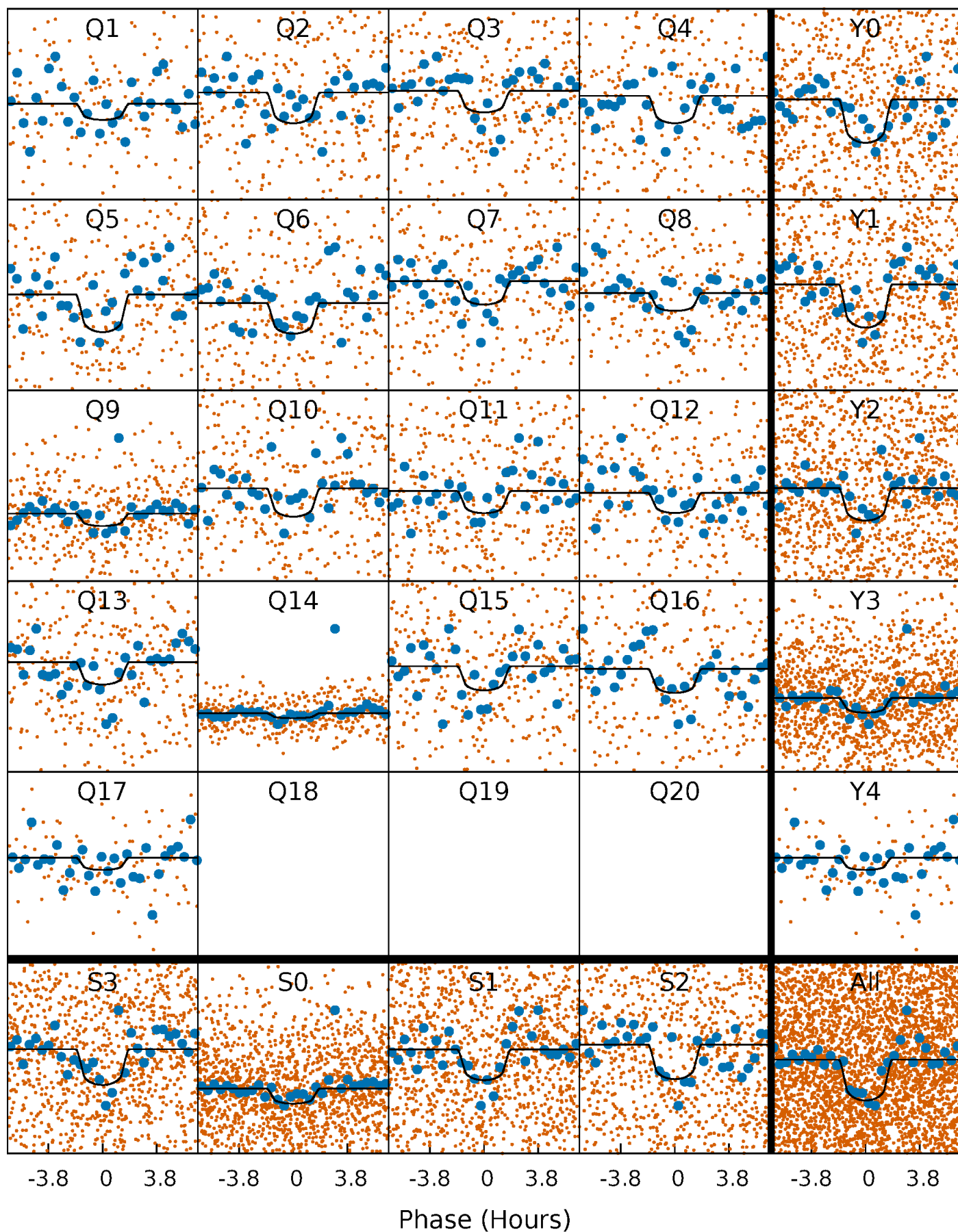
# PDC Quarter-Phased Transit Curves

TCE 005903749-02   P= 6.347276 Days    $T_0=132.998375$  (BKJD)



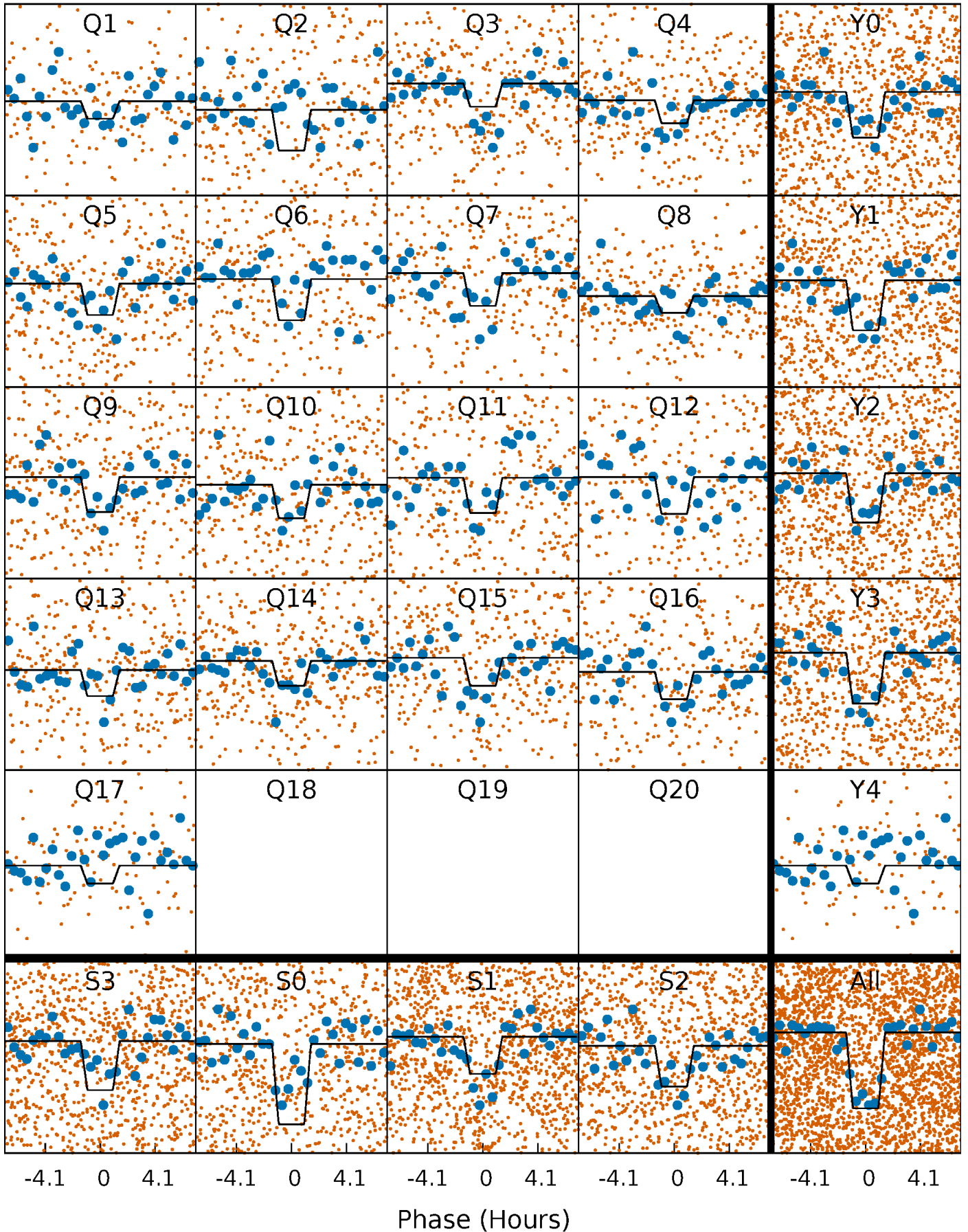
# DV Quarter-Phased Transit Curves

TCE 005903749-02 P= 6.347276 Days  $T_0=132.998375$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005903749-02   P= 6.347332 Days    $T_0=132.994557$  (BKJD)

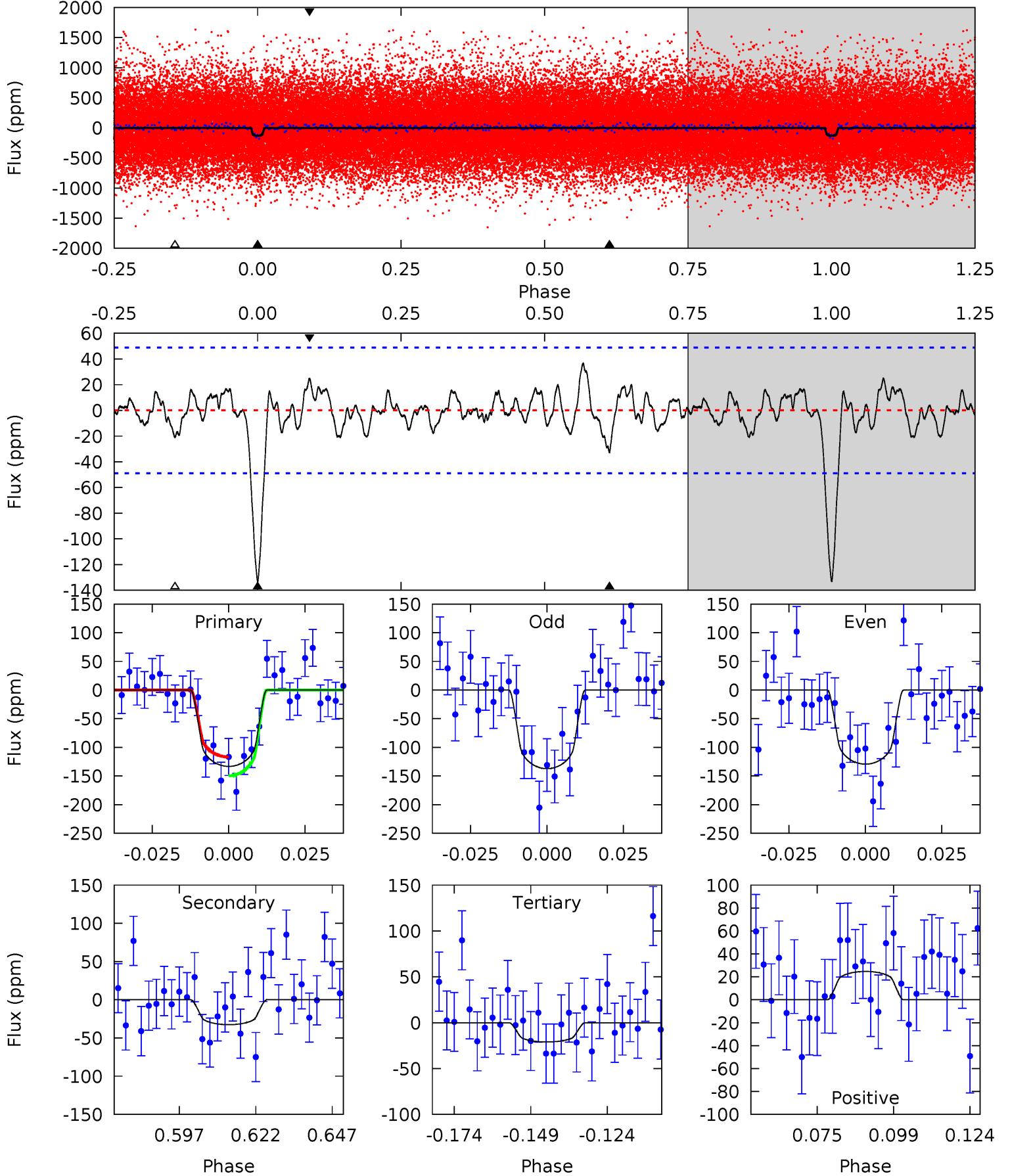




# DV Model-Shift Uniqueness Test

005903749-02, P = 6.347276 Days, E = 126.651099 Days

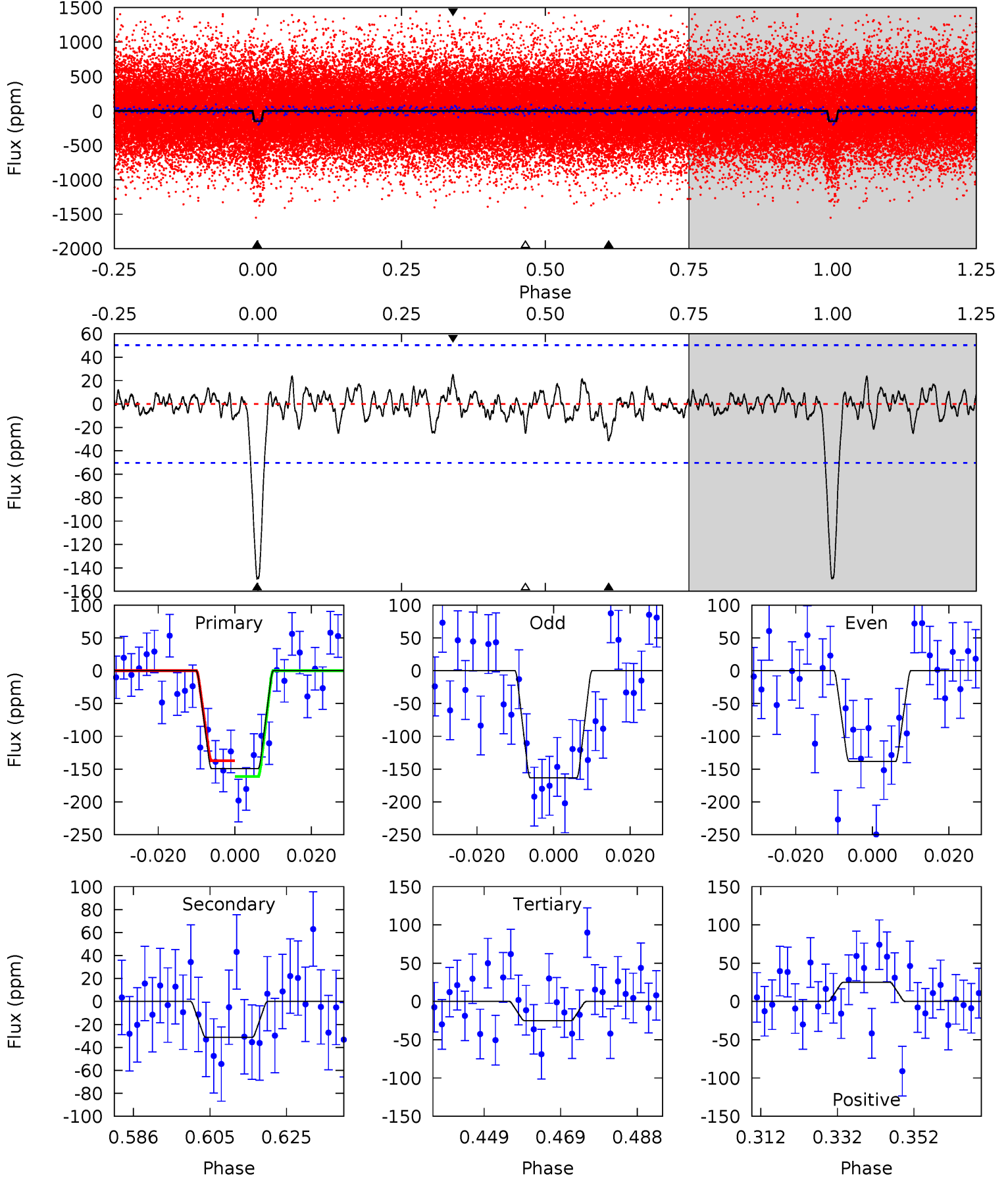
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.2	3.24	2.08	2.45	4.85	2.24	1.02	11.1	10.8	1.15	0.79	0.39	0.95	0.22	1.63



# Alt Model-Shift Uniqueness Test

005903749-02, P = 6.347332 Days, E = 126.647225 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.5	3.04	2.44	2.44	4.90	2.34	0.82	12.1	12.1	0.61	0.61	1.22	1.12	0.14	1.17





### Stellar Parameters For KIC 005903749

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5300^{+79}_{-79}$	$4.385^{+0.126}_{-0.092}$	$0.180^{+0.150}_{-0.100}$	$0.986^{+0.120}_{-0.120}$	$0.861^{+0.059}_{-0.034}$	$1.264^{+0.692}_{-0.351}$
	+1%/-1%	+3%/-2%	+83%/-56%	+12%/-12%	+7%/-4%	+55%/-28%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 005903749-02 / KOI 3029.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-33 \pm 10$	$1.49^{+0.85}_{-0.78}$	$1281^{+51}_{-49}$	$3762^{+1173}_{-560}$	$33^{+107}_{-21}$
Alt.	$-31 \pm 10$	$1.46^{+0.89}_{-0.77}$	$1277^{+49}_{-49}$	$3753^{+1256}_{-596}$	$33^{+112}_{-22}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

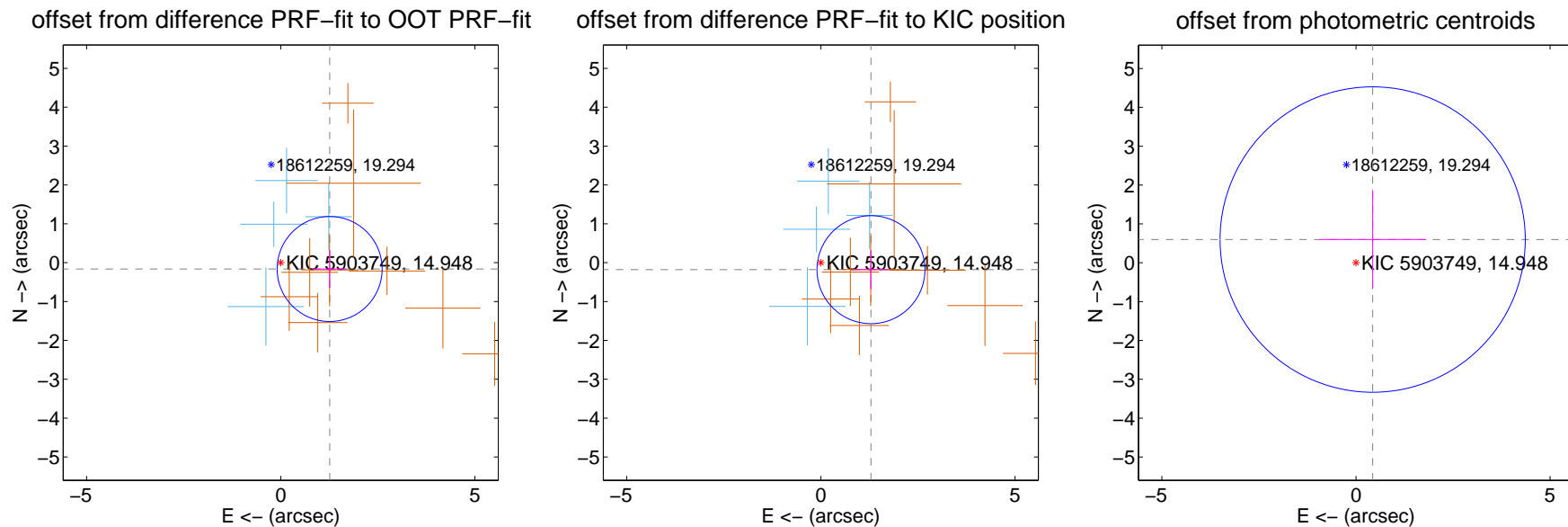
## DV Centroid Data

Supplemental centroid analysis for 005903749-02. Kepler magnitude: 14.95. Transit SNR 9.24

There are 4 quarters with good PRF difference image offsets

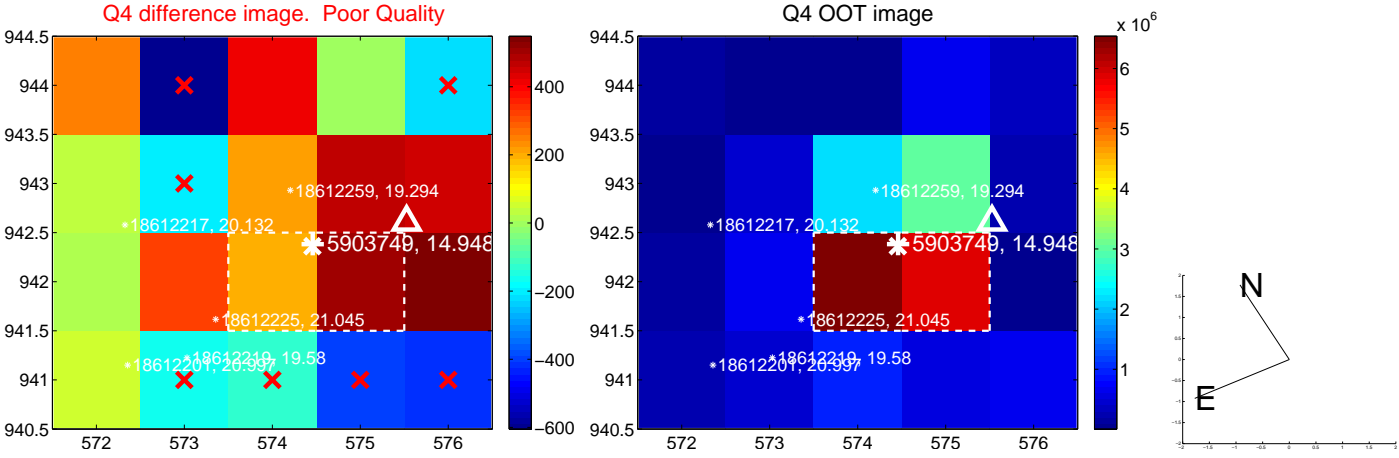
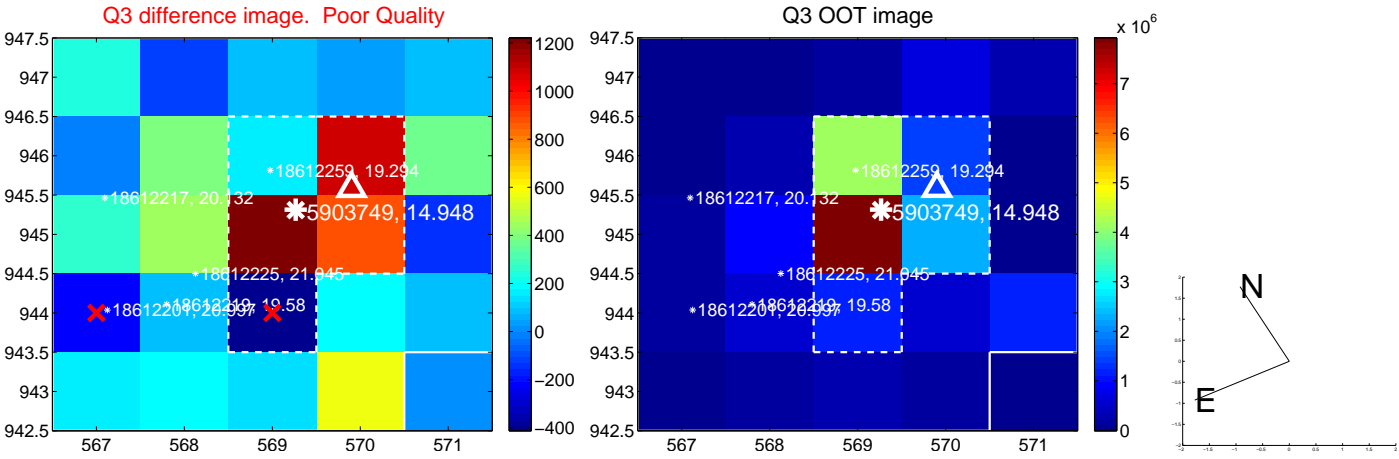
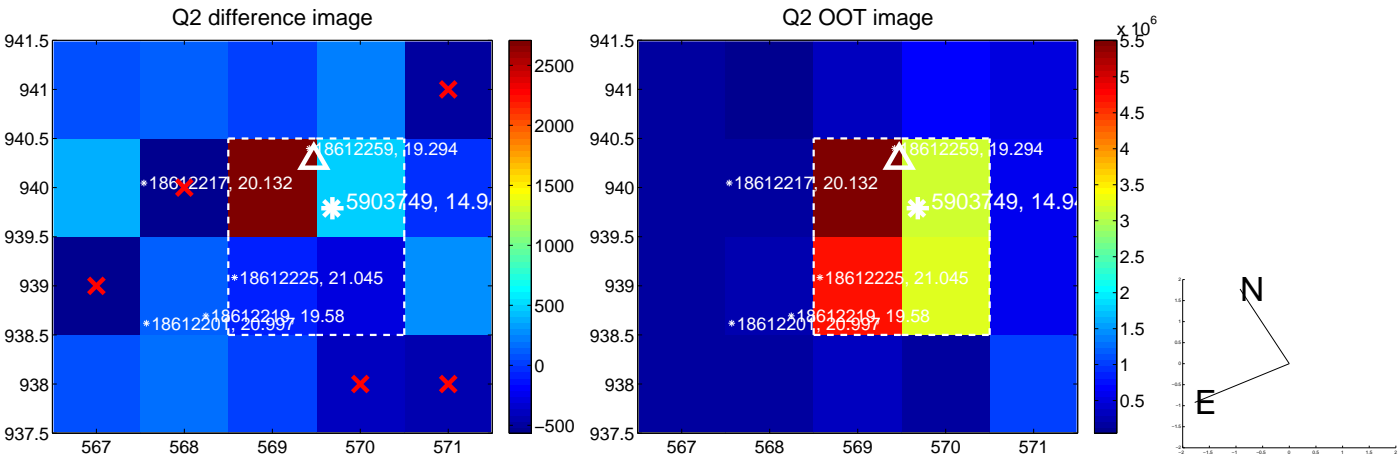
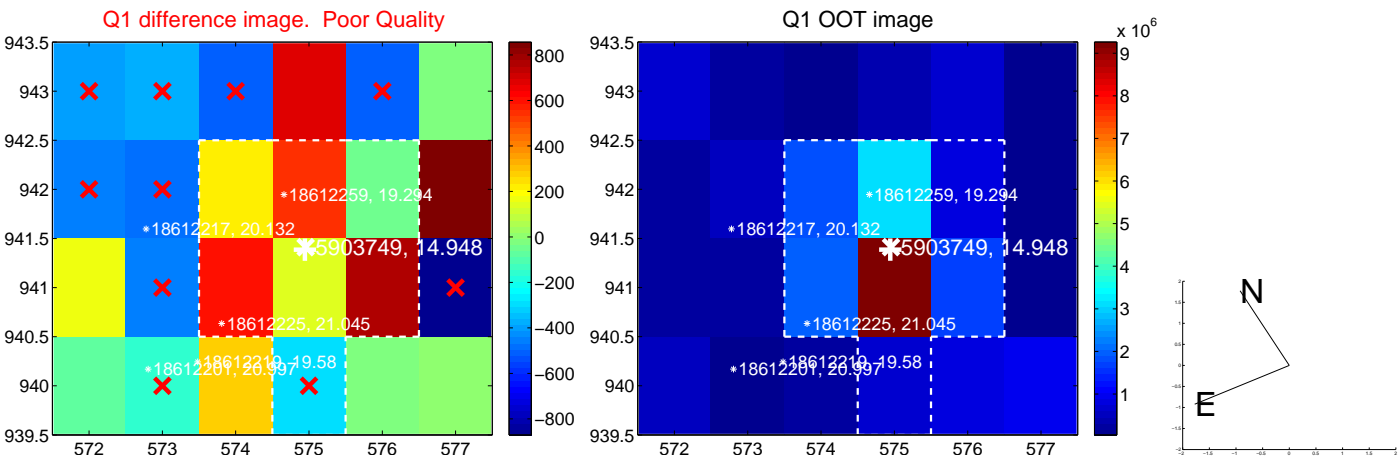
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.270 \pm 0.451$	2.82	$-1.259 \pm 0.432$	$-0.162 \pm 0.486$
PRF-fit source offset from KIC position	$1.303 \pm 0.463$	2.81	$-1.291 \pm 0.441$	$-0.180 \pm 0.503$
photometric centroid source offset	$0.74 \pm 1.31$	0.56	$-0.43 \pm 1.37$	$0.60 \pm 1.28$

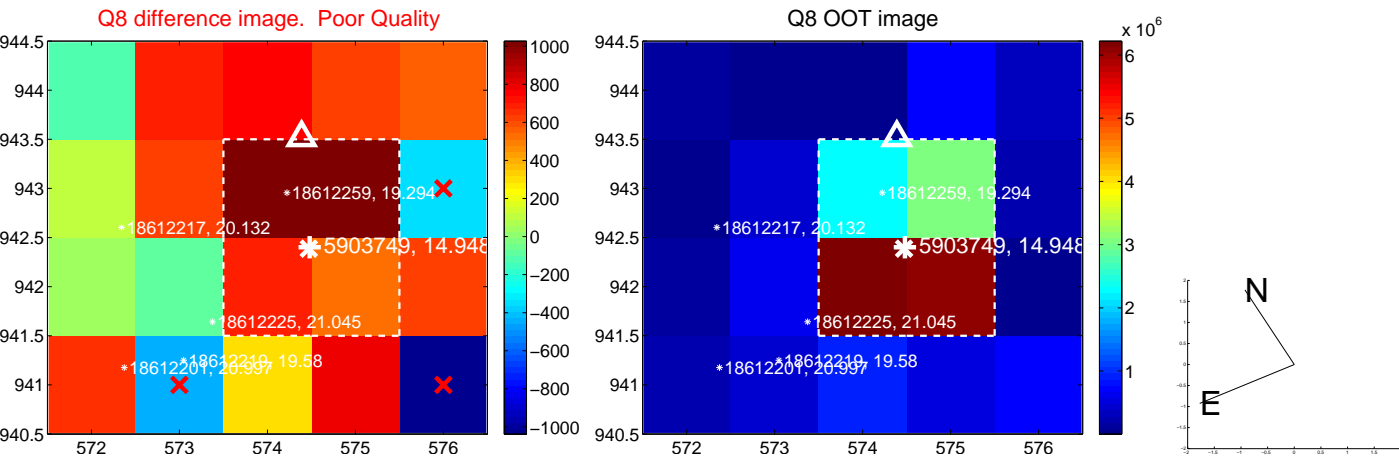
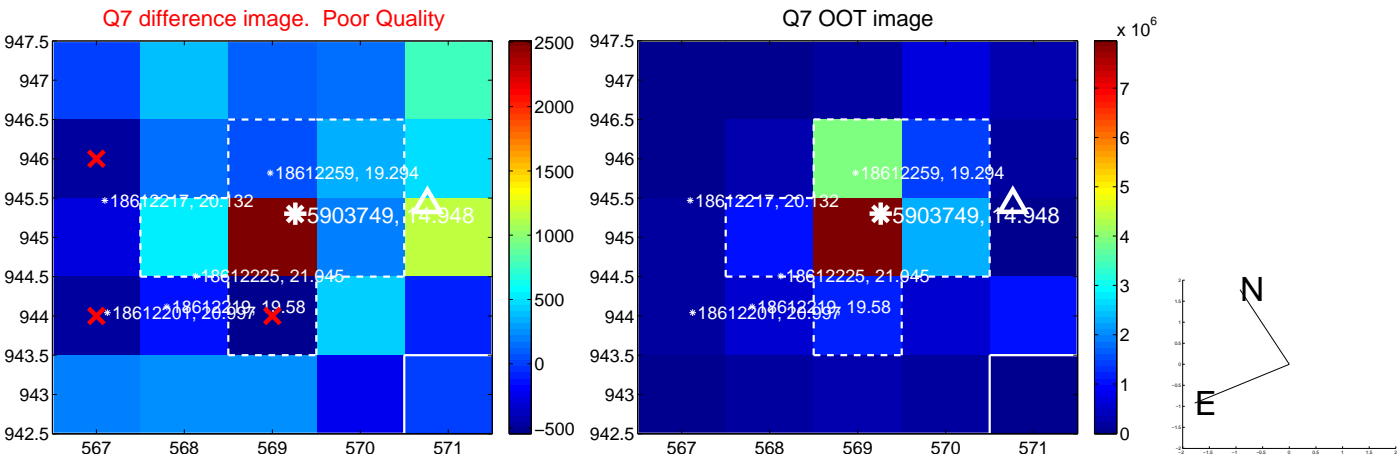
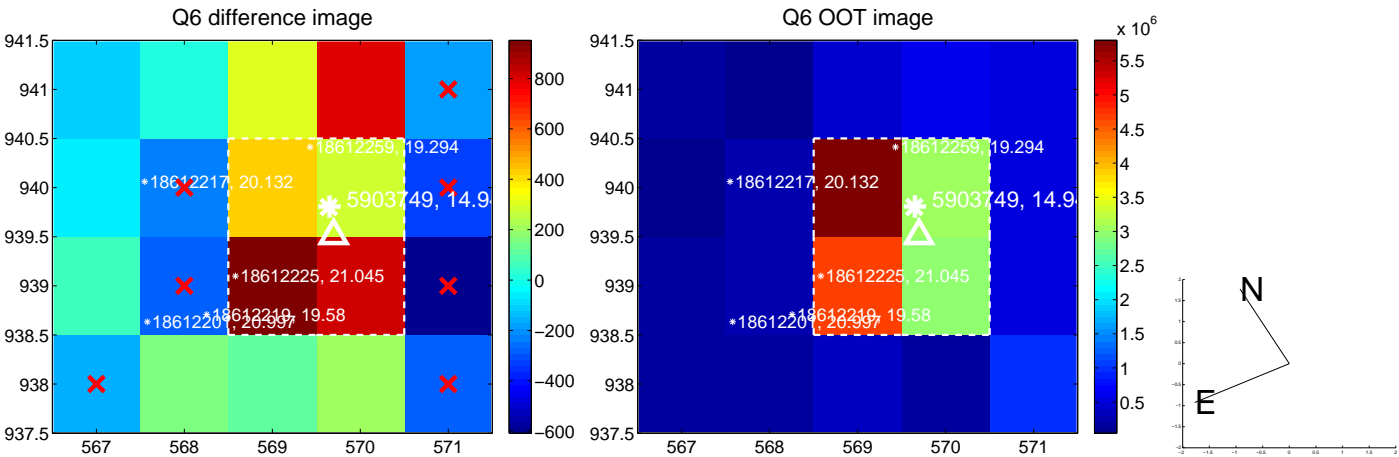
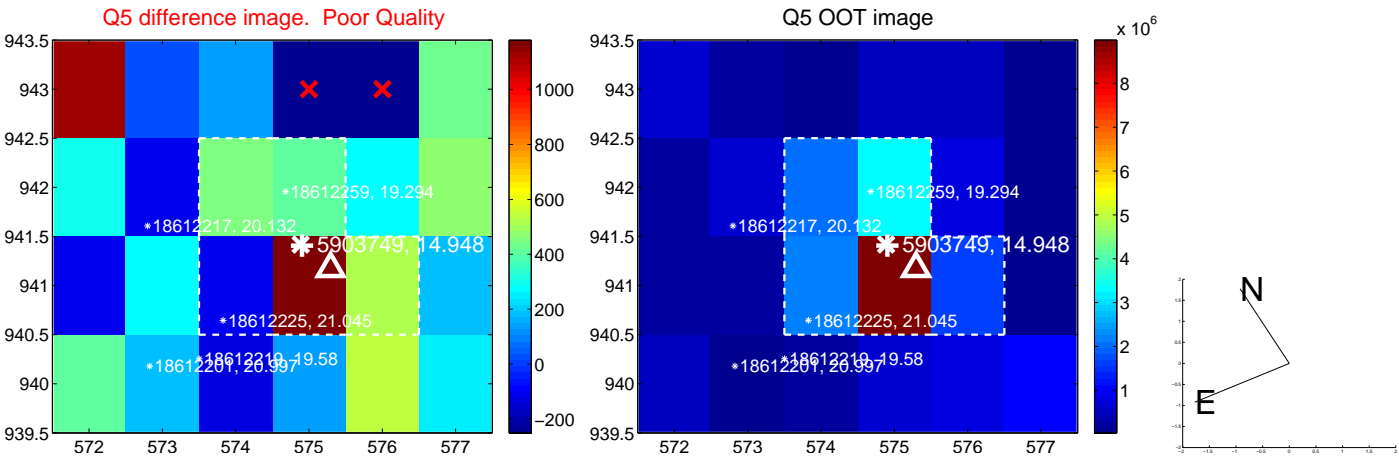


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

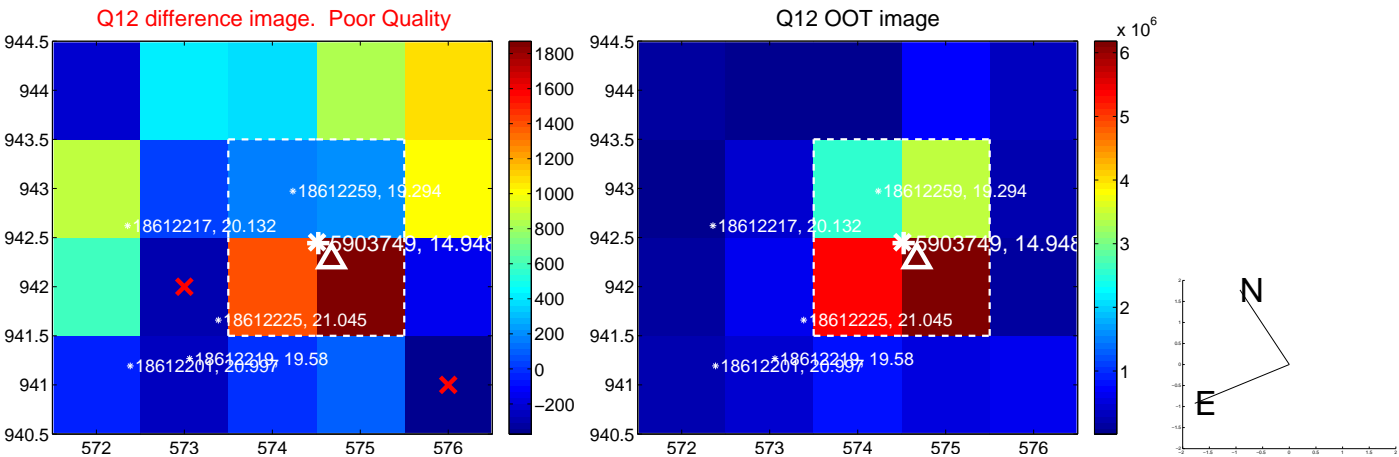
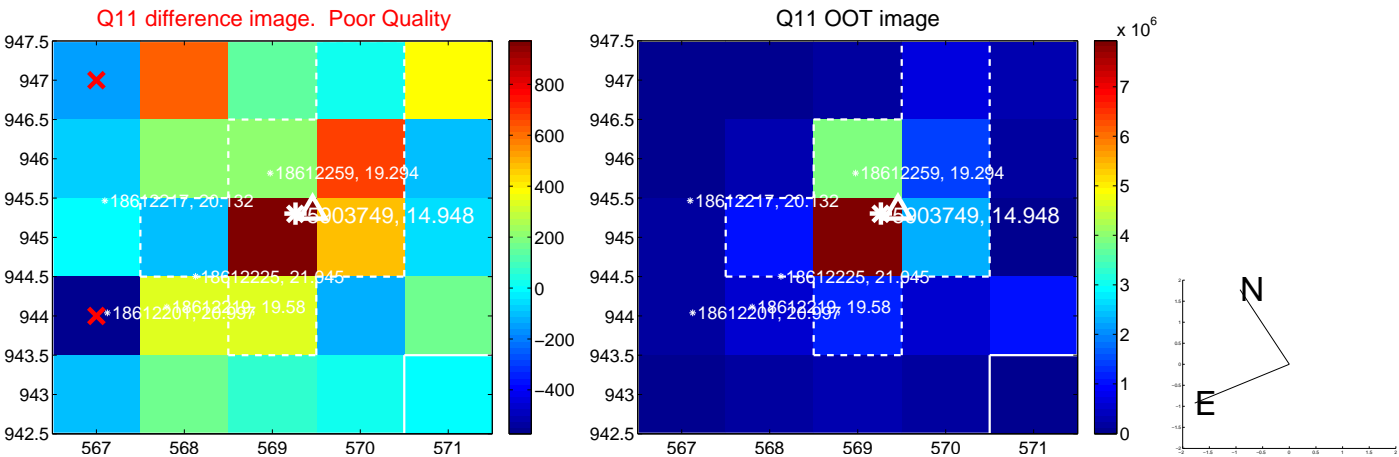
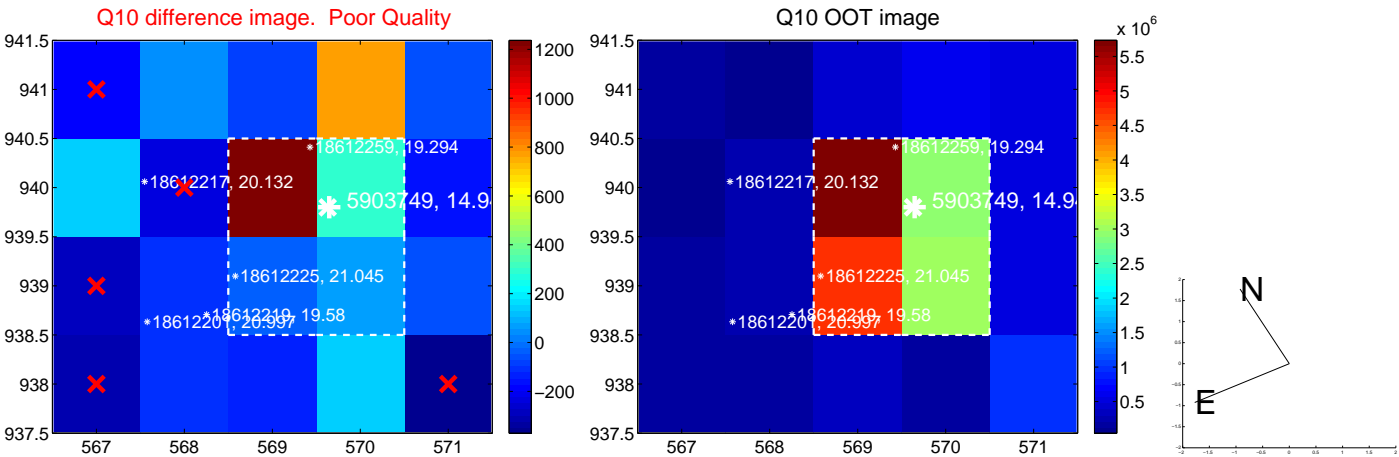
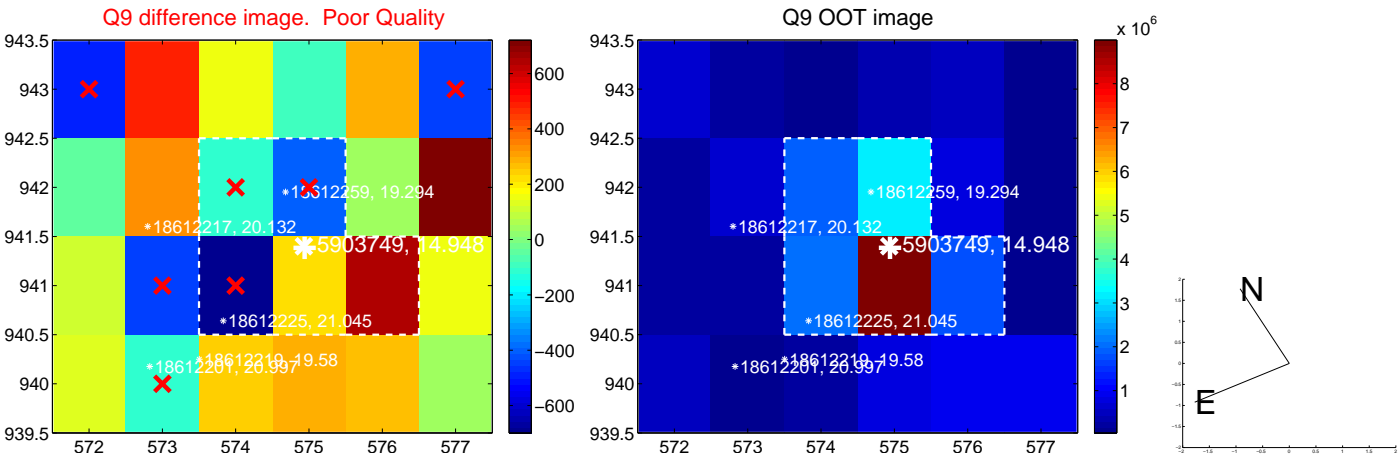
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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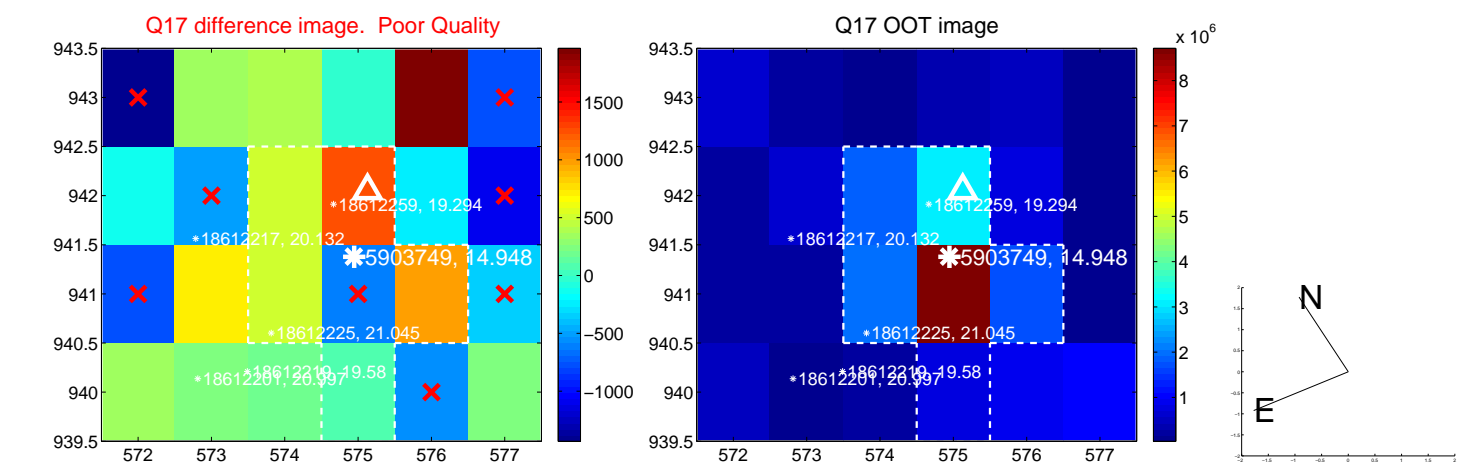
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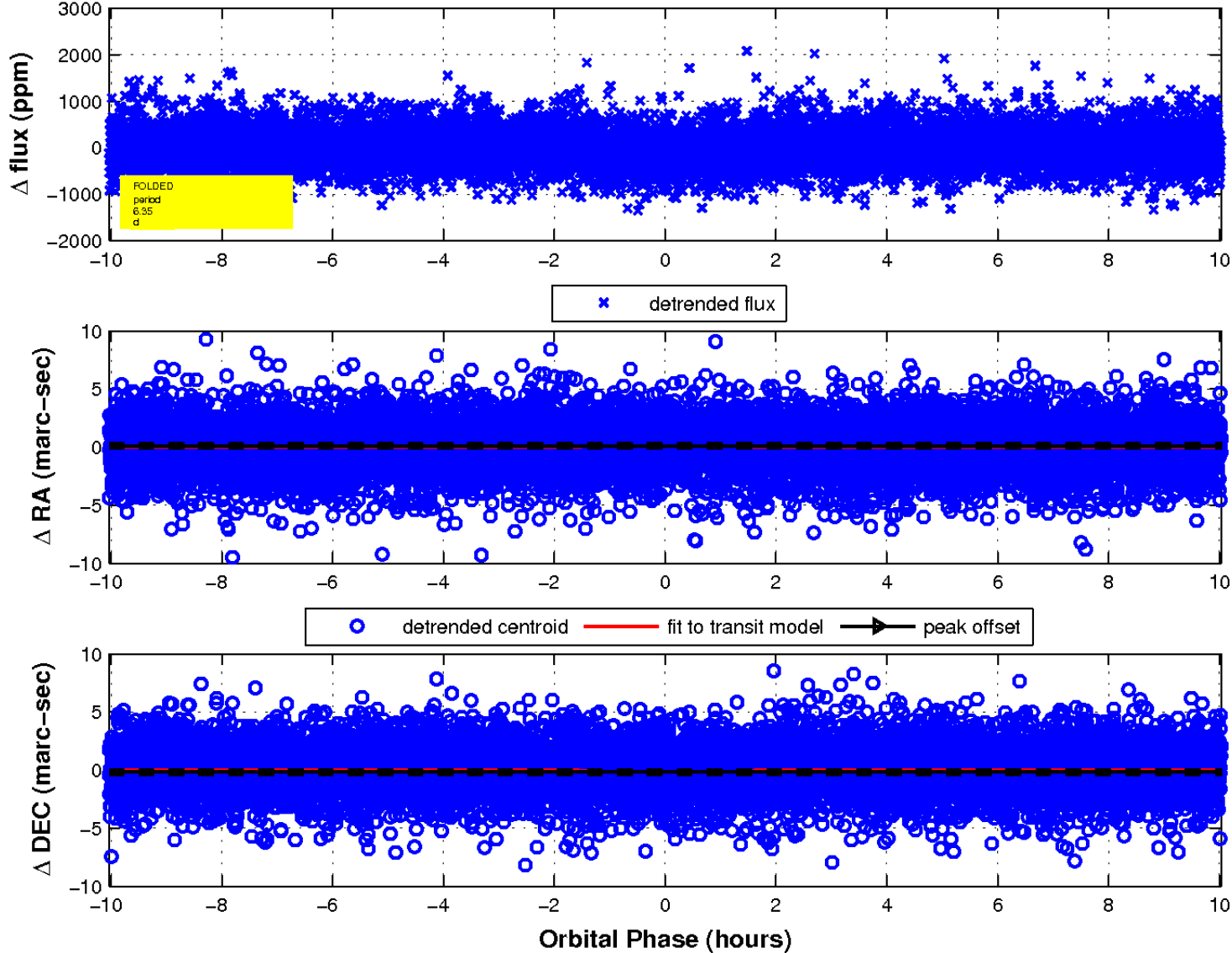




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

